Advant® OCS
with Master software

AdvaBuild® Electrical Diagram Builder

Reference Manual

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Chapter 1 Introduction

1.1 Electrical Diagram Builder

The Electrical Diagram Builder is an application in the Diagram Builder. The program is based within AutoCAD and is designed to simplify the development of circuit diagrams and enclosure layouts.

The Electrical Diagram Builder follows the IEC standards.

1.2 Diagram Builder series

The Diagram Builder series consists of a family of applications and programs that provide assistance in the development of construction work. The products have a common user interface that greatly reduces the learning curve for new users of the system. The products include the Diagram Builder itself, the Electrical Diagram Builder Circuit, and the Electrical Diagram Builder Layout.

Certain basic functions, such as the forms and the symbol directories for the Electrical Diagram Builder Circuit and the Electrical Diagram Builder Layout, are identical. These functions create a common base that can be used by all programs in the Diagram Builder series.

1.3 Different parts of the reference manual

This reference manual consists mainly of brief descriptions of the product functions.
These functions are described in a practical, work-oriented manner. The manual also contains a detailed description regarding settings and maintenance for the product.

1.3.1 Section on Electrical Diagram Builder

This section describes the use of the Electrical Diagram Builder’s special functions. There is also a more detailed chapter about specifying settings according to individual user needs.
The Electrical Diagram Builder function description consists of two main areas: One for the circuit diagram part and another for the layout part (Electrical Diagram Builder layout).

1.3.2 Section on Diagram Builder

This part of the manual describes how the functions of the Diagram Builder base operate and how to adjust these for individual user needs.

1.4 Structure and definitions

The concepts below are used in this manual.

Pulldown menus

These are the menus that can be "pulled down" from the top edge of the screen. With certain graphic systems the cursor must be placed at the top edge of the screen for the pulldown menu bar to appear. The pulldown menus are shown by pointing at a menu bar item.

Digitizer menus

Menus placed onto a menu plate (the digitizer) with numerous squares that display pictures (icons) or text. Each square corresponds to a function.

NOTE

> Digitizer menus (respective tablet menus) are not provided within the Electrical Diagram Builder though described in this document for explanatory reasons. There are adequate screen menus, icon menus and dialog boxes available.

Screen menus

The menu that appears at the right-hand side of the screen. It is used for the functions that are not frequently needed. It is also used by many functions as a platform for choosing alternatives.

Drafting area

The area of the digitizer menu that contains no commands. This area represents the screen. The area to the right side of the broken line represents the screen menu.

Icons

Pictures in the digitizer menu, the pulldown menu (line type, for example), dialog boxes, or icon menus. These are used to emphasis a command in cases where a picture or a graphic description is more suitable than words.

Icon menus

Menus in the shape of a dialog box that are used to choose commands via screen pictures (icons).

Dialog boxes

Dialog boxes are shown on the screen and may consist of an attribute value, system parameter, pictures, and so on. Generally these consist of information that supplements the various menu items.

Directories

A directory is a specific section of the hard disk or diskette in which files can be placed. Directories are created using operating system commands or with the functions that are available for handling adjustments and symbol directories.

Point

When this request is made, point the mouse or digitizer cursor to the requested or desired location, or choose an object on the blueprint by moving the cursor into the drafting area. Then press the mouse button.

ENTER, RETURN, <RET>

ENTER and RETURN represent the RETURN key on the keyboard. Alternatively, you may press the second button of the mouse or the cursor of the digitizer.

SPACE

SPACE represents the space bar on the keyboard.

Initial drawing

When a drawing is first created, a ground plan is installed in which the drawing environment is already configured. The ground plan may sometimes be called the prototype drawing.

Draft Layer

When a circuit diagram is to be analysed by the connection table generator, certain decorative (draft) layers can be added to the layer if they are not intended to be analysed by the table generator.

Design Layer

Whatever is to be analysed by the connection table generator should be “connection giving,” that is, drawn on a connection giving (design) layer.

Default

Preset basic value. A value that the system uses automatically if the user presses ENTER rather than specifying another value in response to a prompt from the system.

Attribute

Most symbols have an area used for specifying terminal numbers and item designations, for example. These areas are called the attribute of the symbol.

Chapter 2 Functions in Electrical Diagram Builder Circuit

This function description is divided into separate subsections, which correspond to the menu items found on the menu bar at the top of the Electrical Diagram Builder Circuit screen.

All functions are described using the following structure:

Function:	Describes what the function does.
Access:	Describes how the function is found according to: <<Menutype>>, <<Title>>, <<Function>>.
Procedure:	Describes the steps that should be taken to use the function.

Note: When references to the digitizer menu are made to squares without printed text, the squares are numbered within their respective areas row by row, starting in the upper left corner: “square 1”, “square 2” and so on.

2.1 Items on the user-interface

Described below are the different parts that make up the user interface of the Electrical Diagram Builder Circuit. The user interface is based primarily on the pulldown menus as well as the digitizer menu. Frequent users of the system will find that the digitizer menus provide the most effective means of accessing the Electrical Diagram Builder Circuit functions, since all the functions are visible and easily accessible.

2.1.1 Pulldown menus

A pulldown menu is a menu, that appears when the crosshair cursor is moved to the top edge of the screen. It has a number of headings; the submenus for a heading appear when you point to the heading. This menu contains almost all commands except the basic commands of the Diagram Builder and the commands to build symbols.

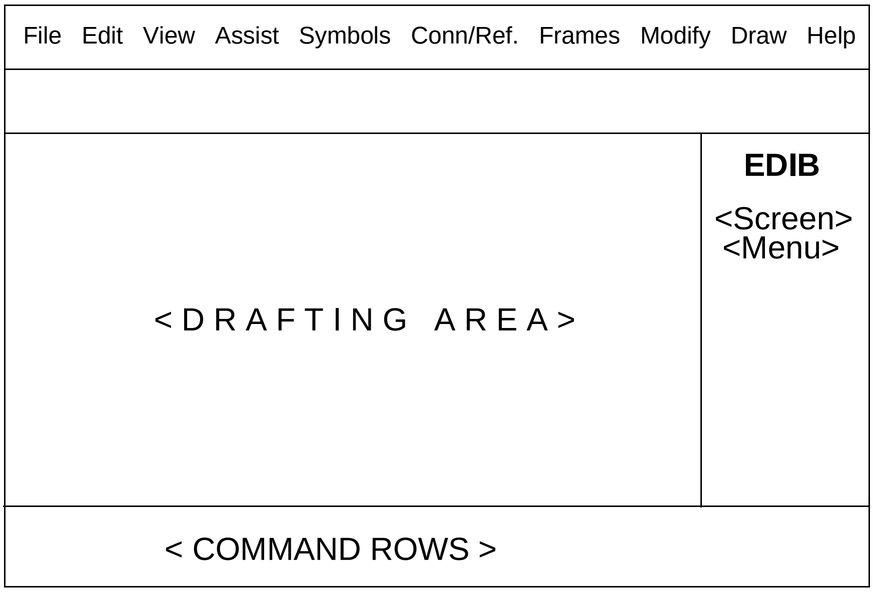

File Edit View Assist Symbols Conn/Ref. Frames Modify Draw Help
EDIB
<Screen>
<Menu>
<DRAFTING AREA>
< COMMAND ROWS >

Figure 2-1. Pull-down Menus

The pulldown menus are made up of commands from the Electrical Diagram Builder Circuit, the Diagram Builder, as well as pure AutoCAD commands. The following table shows where each of the commands are described. Note that with the AutoCAD commands, the exact location in the AutoCAD manual has not been provided.

Table 2-1. Pull-Down Menus

Title	Function	Description
File	New	AutoCAD
	Open	AutoCAD
	Save	AutoCAD
	Save As	AutoCAD
	Recover	AutoCAD
	Quit	AutoCAD
	DIBPLOT	Diagram Builder
	Plot	AutoCAD
	Global changes	Diagram Builder
	Configure	AutoCAD
	EPS, Net/Sheet	Section 2.2.1, EPS
	EPS, Show error	Section 2.2.1, EPS
	EPS, Net/Diagram	Section 2.2.1, EPS
	About Electrical Diagram Builder	Section 2.2.2, About EDIB
	End-CT	Section 2.2.3, End CT
	End Electrical Diagram Builder	Section 2.2.4, End EDIB
View	Zoom	AutoCAD
	Pan	AutoCAD
	Redraw	AutoCAD
	Redraw all	AutoCAD
	Regen	AutoCAD
	Layer...	Section 2.3.1, Layers...
Assist	Help	AutoCAD
	Cancel	AutoCAD
	Undo	AutoCAD
	Redo	AutoCAD
	Object filter	AutoCAD
	Object Snap	AutoCAD
	Inquiry	AutoCAD

Table 2-1. Pull-Down Menus (Continued)

Title	Function	Description
Symbols	Relay/Contacts, Main Circuit, and so on.	Section 2.4.1, Symbol groups on the pulldown menus
	Term. blocks	Section 2.4.2, Terminal blocks
	Special symb, Spec. cond.	Section 2.4.3, Conductor specifications
Conn/Ref.	Draft	Section 2.5.1, Draft\Design
	Design	Section 2.5.1, Draft\Design
	Line/Layer	Section 2.5.2, Line types\Layers
	Supply	Section 2.5.4, Supplies (Electrical Sources)
	One conn.line	Section 2.5.5, One connection line
	Free conn.line	Section 2.5.6, Free connection line
	Mult. conn.line	Section 2.5.7, Multiple connections
	Cable	Section 2.5.8, Cable
	Mech.link	Section 2.5.9, Mechanical link
	One ref	Section 2.5.10, One Reference
	Line Diagr/Sheet	Section 2.5.11, Insertion of line, diagram/sheet reference
	Brackets	Section 2.5.12, Brackets
	Constr.inf.	Section 2.5.13, Construction information
	Conn.controll	Section 2.5.14, Connection control
	Zero.no.	Section 2.5.15, CONN. ZERO NO.
Frames	1 Item des.	Section 2.6.1, 1 Item des, 2 Item des.
	2 Item des	Section 2.6.1, 1 Item des, 2 Item des.
	Dashdot line	Section 2.6.2, Line types for frames
	Double dashdot line	Section 2.6.2, Line types for frames
	Cont. line	Section 2.6.2, Line types for frames
	Conn.Pt	Section 2.6.3, Connection Points, Conn. Pt.
	Common Item des.	Section 2.6.4, SHEET-COMMON ITEM DES.

Table 2-1. Pull-Down Menus (Continued)

Title	Function	Description
Modify	Layer	AutoCAD
	Erase	AutoCAD
	Remove Symb	Section 2.7.2, Remove Symbol
	Frame-side off	Section 2.7.3, Frame-side off
	Move	AutoCAD
	EDIB Move, With conn.	Section 2.7.4, EDIB.Move
	EDIB Move, Text/Symb	Section 2.7.4, EDIB.Move
	EDIB Move, Conn.	Section 2.7.4, EDIB.Move
	EDIB Move, Text Up	Section 2.7.4, EDIB.Move
	Design->Draft	Section 2.7.5, Design – Draft
	Draft->Design	Section 2.7.6, Draft – Design
	Change	AutoCAD
	Rotate	AutoCAD
	Copy	AutoCAD
	Edit Text	AutoCAD
	Change Text	Section 2.7.8, Change Text
	Edit Attribute. Value	Section 2.7.9, Edit attribute. Value
	Edit attribute. Position	Section 2.7.10, Edit attribute. Position
	Edit attribute. Angle 0+position	Section 2.7.11, Edit attribute. Angle 0+Position
	Edit attribute. Angle	Section 2.7.12, Edit attribute. Angle
	Global edit	Section 2.7.13, Global Edit.
	Show/Hide Item des.	Section 2.7.14, Show/Hide Item Designation
	To constr.layer	Section 2.7.15, Change to Construction Layer
	Edit term.block row	Section 2.7.16, Edit terminal block rows
	Edit Sheet ref.	Section 2.7.17, Edit Sheet References
	Edit Apparatus	Section 2.7.18, Edit Apparatus

Table 2-1. Pull-Down Menus (Continued)

Title	Function	Description
Draw	Text	Section 2.8.1, Text
	Line	AutoCAD
	Arc	AutoCAD
	Circle	AutoCAD
	Point	AutoCAD
	Insert	AutoCAD

2.1.2 Cursor menus

The cursor menus can be accessed by pressing on the second button of the cursor in combination with keyboard commands (see functions of the cursor menus below). The following cursor menus are used in the Electrical Diagram Builder Circuit:

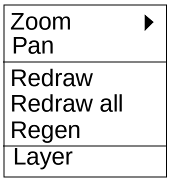
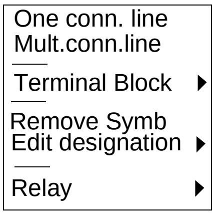
Name	Contents
View	AutoCAD display commands (Diagram Builder menu) 
Diagram	A selection of common diagram commands taken from the pulldown menus  One conn. line Mult.conn.line Terminal Block Remove Symb Edit designation Relay

Figure 2-2. Cursor Menus

2.1.3 Functions of the cursor menu

The following buttons on the mouse, or digitizer cursor, are used in the Electrical Diagram Builder Circuit: (the first button, button 0, is used for pointing).

PD <no> = Pulldown menu, where “no” is number in order counting from the left.

CM-<name> = Cursor menu, according to the names given above.

Table 2-2. Functions of the Cursor Menu

Button no	**Only button**	**Button+shift**	**Button+Ctrl**	**Button+Shift+Ctrl**
Button 1	Enter	CM-Diagram	CM-View	
Button 2	Snap			
Button 3	Ortho			
Button 4	PD 3			
Button 5	PD 4			
Button 6	PD 5			
Button 7	PD 6			
Button 8	PD 7			
Button 9	PD 8			

2.1.4 Digitizer menus

The Electrical Diagram Builder Circuit insertion menus are:

- 1L-3L, red, used in the diagram section for insertion of symbols
- 1R, green, commands in the diagram section
- 2R, green, commands for the creation of diagram symbols.

2.1.4.1 Sections of the Digitizer Menu

The same functions that are found on the pulldown menus can also be accessed from the digitizer menus. However, since the two menus are used in different ways, the areas of digitizer menus are divided differently from the pulldown menus. The table below acts as an index for finding the corresponding commands on the screen.

Since the pulldown menus must make accommodations for low resolution video systems, for example VGA, they use up less space than the digitizer menus. This is why there may be many items in the digitizer menu that point to the same item on the pulldown menu.

Table 2-3. Digitizer-menu and Corresponding Group in Pulldown-menu

Section on digitizer-menu	**Corresponding group in pulldown-menu or screen-menu**
SETTINGS	Screen menu 1
LINETYPE/LAYER	Conn/Ref, Line/Layers
BOUNDARY FRAMES	Frames
TERM.BLOCK	Symbols, Term.blocks
CONN.LINES	Conn/Ref
CABLE/CORD SPEC	Symbols, Spec.cond
DECORATIVE TEXT	Draw
REFERENCES	Conn/Ref
CHANGE & MOVE	Modify
EDIT DESIGNATION	Modify
SYMLIB	Screen menu symlib
CORD DATA	Conn/Ref
NET DATA	Conn/Ref
CONN.DATA	Conn/Ref

2.1.4.2 Nomenclature of the Digitizer Menus

On the application menu there are certain codes in the corners of the boxes to make the commands clearer. The nomenclature used is as follows:

“S” in the bottom left corner means that the command puts up a screen menu on which the command or parts of it continue.

“D” in the bottom right corner shows whether a command or a symbol is decorative, if there is any doubt. This is important when the circuit diagrams are to undergo CT generation.

“n” A number in the bottom left corner is used to indicate the sequence in which commands are to be performed. If the number is followed by a dot (period), it is the last command in the sequence.

“-” A minus sign in a symbol box shows that the symbol has no apparatus data in it. Note that several non-apparatus items do not have a minus sign in the box.

2.1.4.3 Changing the Insertion Menu

Left menus 1L, 2L, 3L.

Procedure: Place the tablet (menu) on the left-hand side of the digitizer.
Point to the box (1L, 2L, 3L) for the chosen menu. The text in the box with that menu is always red. (Menu 1L is default on starting.)

Right menu 1R.

Procedure: Place the tablet (menu) on the right-hand side of the digitizer.
Point to box “1R” (note that this is not necessary on starting since Menu 1R is the default.)

Right menu 2R.

Procedure: Place the tablet (menu) on the right-hand side of the digitizer.
Point to box “2R”.
Point to box “INIT Menu 2R”.
To return to menu 1R point to the “Reset” box.

2.1.5 Icon Menus

These are used to access the less frequently needed symbol groups. Always check the digitizer menus first.

2.2 File

2.2.1 EPS

The functions in this section require that the Electrical Diagram Builder EPS be installed. This is not included in installations within AdvaBuild.

2.2.2 About EDIB

Function: Displays information about the Electrical Diagram Builder Circuit Program.

Access: Pulldown menu: File, About **EDIB**

2.2.3 End CT

Function: Used when the diagram is ready. The function makes a preparatory analysis to determine whether boxes and/or mechanical links have been used.

Access: Pulldown menu: File, End-CT

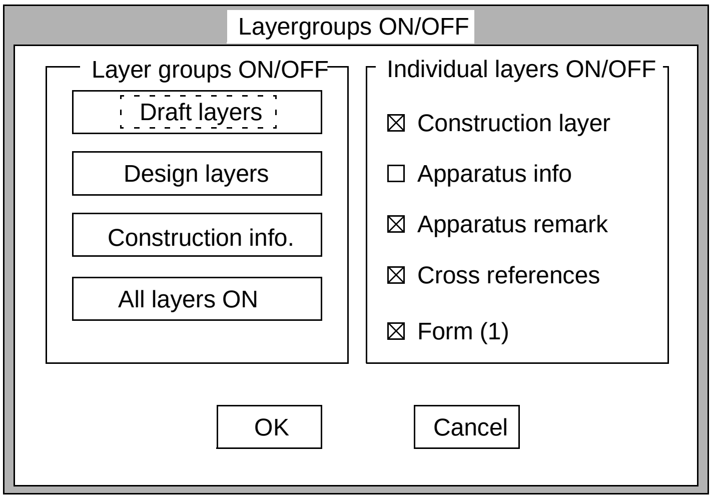
Procedure: Activate the command.

2.2.4 End EDIB

Function:	This function saves the drawing and exits from AutoCAD and the Electrical Diagram Builder Circuit.
Access:	Pulldown menu: File, End EDIB
Procedure:	Activate the command.

2.3 View

2.3.1 Layers...



Layergroups ON/OFF

Layer groups ON/OFF

Individual layers ON/OFF

☒ Construction layer
☐ Apparatus info
☒ Apparatus remark
☒ Cross references
☒ Form (1)

Figure 2-3. Layer Groups ON/OFF

Function:	Displays a dialog box with two areas: Layer groups ON/OFF and Individual layers ON/OFF. These areas indicate whether a given layer is on or off. The dialog box will remain on the screen while the function is active.
Access:	Pulldown menu: View, Layers... Digitizer menu 1R: LINETYPE/LAYER, VIEW LAYERS
Procedure:	Push the button and/or turn on or off (mark or clear) the check box.

2.3.1.1 Layer Groups ON/OFF

Toggles on and off the different layer groups that are used to separate the various types of information.

Draft layers	Toggles on and off all the layers used for decorative drawing from within the construction specific environment (Layers:102-107). Decorative texts cannot be turned off as they are always decorative.
Design layers	Toggles on and off all the layers used for connection giving drawings from within the construction specific environment (Layers: 2-13). Decorative texts can also be switched off with this command.
Construction information	Toggles on and off layers that contain so called Construction information which is essential to the designer but is not wanted when the drawing is plotted. ($CON,$TMP,$APP)
All layers on	Toggles on and off all layers, except those that are never tuned on. (Not $OFF,NODE_I)

2.3.1.2 Individual Layers ON/OFF

Toggles on and off individual layers.

Construction Layers	Layers used for construction data that are accessible to the end user, see Line types/Layers under Conn/Ref below. (Layer $CON)
Apparatus information	Layer used for apparatus information in the symbols. A type of Construction information. (Layer $APP)
Apparatus remarks	Layer used for apparatus information. As opposed to the layer Apparatus information, described above, this layer is often required to be turned on. One example is comments on I/O symbols. (layer $A_REM)
Cross references	Layer used for reference notes between different parts of an apparatus. (layer “$CREF”).
Form	Layer to be used for lines in the form in order to facilitate turning them off when using a pre-printed form. (Layer “1”)

2.4 Symbols

Function: The Electrical Diagram Builder Circuit drafting environment contains a large number of symbols conforming to the IEC-617 standards. The most common of these symbols appear on the digitizer menus 1L-3L as well as the icon menus. Less common symbols appear only on icon menus.
Below, a Procedure is described that concerns all symbols. In those cases where special commands are available, they are described below, for example Terminals. A more thorough description of the symbol placement on the digitizer menu is found in Chapter 3 Apparatus and symbols - Menus 1L, 2L, 3L. How the symbols are arranged in the directory structure is described in more detail in Section 2.9.4 Symbol library.

The symbols fall broadly into four categories:

- **1.** Pure IEC symbols with or without item designation and terminals, which are connection-giving but are not related to an apparatus in the parts list. These symbols are used as qualifying symbols, as decorative symbols, or, for example, to construct more complex symbols.
- **2A.** Apparatus symbols to IEC. These are planned to be related to an apparatus in the parts list and contain at least a type designation and two comment fields, in addition to item designation and terminals. Example: a relay coil.

  2B. Parts of apparatus to IEC representing, for example, single contacts or channels of an apparatus. Those symbols are called “daughter symbols” and must have a “mother symbol” for referencing purpose, for example, to make contact to relay references coil. “Daughter symbols” representing I/O channels of a DCS/PLC system have an additional set of attributes. (See User’s manual Appendix C.2.3).

  > **Note!** Not all symbols in categories 2A and 2B are specified in detail in IEC 617; they may be constructed from IEC symbols, such as instruments. This is permitted and is normal practice.

- **Other symbols**. Ancillary symbols such as ready-made supplies, which may be made up, and are not specified in any standard.
- **Reference symbols.** Used to indicate where another symbol is located, for example, contact trees.

All symbols are placed in the drawing by clicking on the relevant box and pointing to the insertion point. When the symbol is inserted, the system sometimes asks for an insertion angle, depending on how the symbol is used.

The symbols in categories 2A and 2B are grouped into their apparatus categories on the Digitizer menus 1L-3L. Those symbols that are not shown can be accessed on icon menus via a box in the group, for example “MORE CONTACTS”. All of these apparatus categories are described in Chapter 3, Apparatus and symbols - Menus 1L, 2L, 3L..

Where they exist in a variant as an apparatus or part of an apparatus, pure IEC symbols in category 1 above cannot always be accessed via a menu. In such situations they can be inserted with the INSERT command together with their symbol name.

Automatic removal of connection line

All symbols supplied with the product can be placed on top of an existing conductor. The part of the conductor covered by the symbol is automatically erased.

Repeated insertion

Insertion of a symbol can be repeated by pressing ENTER.

Access: Digitizer menus 1L-3L
Pulldown menu: Symbols (see below)

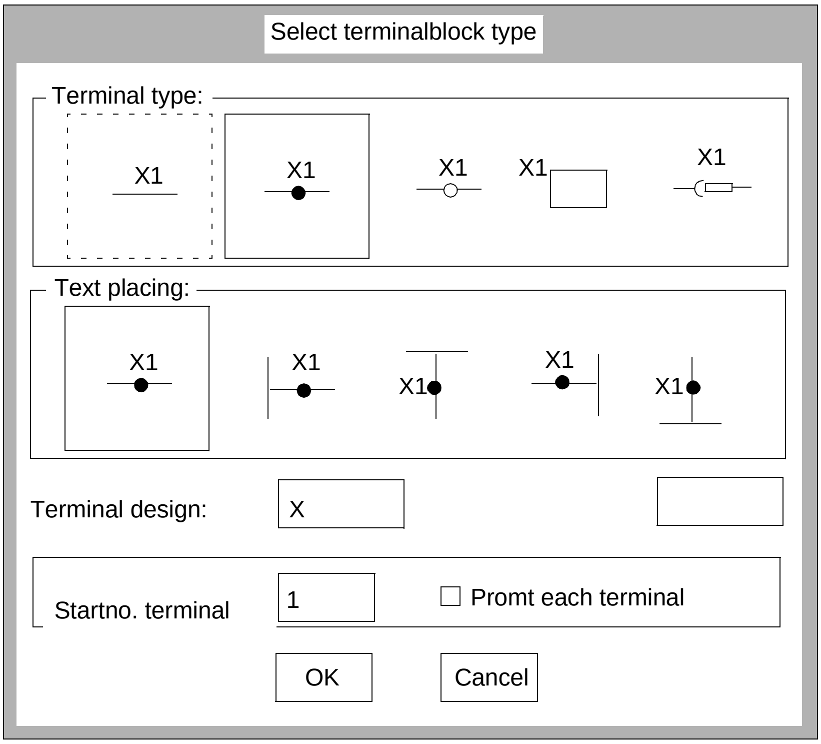
Procedure: Select required symbol.
Point to the insertion point.
Specify the insertion angle.
Specify attribute values.
To repeat the insertion, press Enter.

2.4.1 Symbol groups on the pulldown menus

Relays/Contacts	Coils
	Contacts
Main Circuit	Power circuit
	Motors
	Transf.
	Conductors
Sensors	
I/O	
Protecting dev.	
Signal eq.	
Instruments	
Switches	
Transducers	
Connectors	
Pilot-switches	
Volt/Curr sources	
Functional units	
Components	Passive comp.
	Semicond.
	Filters
	Inductors

Term.block	Type	
	Term des/number	
	Ins.One	
	Ins Row	
	Man.Ins	
Special symb.	Qualifying symb.	
	Spec cond.	Symbols
		Cond.group
		Arrow
		Mark
	Single line	
	Cross ref.	
More		

2.4.2 Terminal blocks



Terminal design: X

Startno. terminal 1

☐ Promt each terminal

Figure 2-4. Select Terminal Block Type

2.4.2.1 TYPE

Function: Specifies the current default terminal block type. All terminal blocks have pitch, that is, a distance between the two connection points; this is essential in order to distinguish between the 1-side and the 2-side.
If there are no conductors connected to the terminal block, and you want to switch off the visible line, this can be done by placing the terminal on the designer layer and then switching off the designer layer.
The command involves two steps:

1. Choose terminal block type: dot, ring or none, and determine the contact type/diagram contact device and connection diagram terminal.

2. Choose text placing (not necessary if you select contact device or connection diagram terminal.)

Terminal types used in boundary frames are placed 2.5 mm inside the frame (1 “snap”-step) and have text justified 1 mm from the frame. The terminal’s 2-side is turned outwards.

These are the text placing options:
Left; used on the left of boundary frames.
Right; used on the right of boundary frames.
Up; used on the upper side in boundary frames.
Down; used on the lower side in boundary frames.
Center; used freestanding in and outside boundary frames; the text is centered. This terminal does not have a 1-side or 2-side; this can be specified with construction data.
Connector; for this symbol, do not specify the type first. Type and text placing are combined in the same function. Does not have 1/2-sides.
“Box”; used in connection diagrams. Type and text placing are combined in the same function. Does not have 1/2-sides.

Access: Make appropriate choice at every step on the application menu or on the pulldown menu.

Procedure: Select type and then text placing on the application menu or on the pulldown menu.

2.4.2.2 Set terminal designation and start number, TERM. DES. STARTNO.

Function: Some of the functions below have automatic numbering of the terminal blocks and automatically put in the valid terminal designation, start number for terminal, and count-up factor for terminal numbering. The system also asks whether the terminal numbers are to be verified. If you answer N(o), no prompt about the proposed terminal numbering appears.
Note that this function is not needed unless the value is to be set or changed.

Access: Pulldown menu: Symbols, Term.Blocks, Term.Des./Number.
Digitizer menu 1R: TERM.BLOCKS, ITEMDES. STARTNO.

Procedure: If the terminal designation and terminal number are asked for or need to be changed, do so when prompted.

2.4.2.3 Insert one

Function: Inserts terminal blocks in the drawing. The terminal block type, terminal designation, terminal number, and so on, must be specified according to the above.
When a terminal block is inserted in the drawing, the system suggests a value for the terminal designation, unless verification is switched off (see “TERM. DES. START NO.” above); this value can be accepted with Return or ignored by entering another value. If you enter your own value, note that the next value will be that value plus the count-up factor. If a non-integer value is entered, for example “6A”, the integer will not be counted up. The command is repeating within itself; in other words, terminal blocks can be inserted in sequence until you exit the command.

Access: Pulldown menu: Symbols, Term.Blocks, Ins. One
Digitizer menu 1R: TERM.BLOCKS, INSERT ONE

Procedure: Point to the insertion point.
Specify an angle by pointing or answering numerically. Angle zero is default; for this, press Enter.
If verification is not switched off, confirm with the terminal value offered by the system by pressing Enter or Space, or enter another value.
Quit the command with Enter or insert another terminal.

2.4.2.4 Insert row

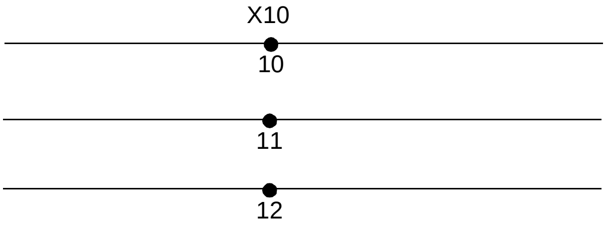


Figure 2-5. Insert Row

Function: Inserts a complete row of terminal blocks, either in the X-direction or in the Y-direction. The item designation is switched off automatically on all terminal blocks except the first.
Input of designation and number is done in the same manner as described above, under “Ins. One”.

Access: Pulldown menu: Symbols, Term.Blocks, Ins. Row
Digitizer menu 1R: TERM.BLOCKS, INSERT ROW

Procedure: Point at the insertion point.
Point out the distance to the next.
Specify the angle by pointing or giving a number. Or, accept the default value of zero by pressing ENTER.
Specify the row number.
If verification is not switched off, confirm the terminal value offered by the system by pressing ENTER, SPACE, or entering another value.

2.4.2.5 Manual Insertion, MAN. INS.

Function:	Insert a terminal in the drawing. The terminal type must be determined with the “TYPE” command. Apart from this, the command works like the regular AutoCAD “INSERT” command. The user is responsible for entering of attribute values.
Access:	Pulldown menu: Term.Blocks, Man.Ins. Digitizer menu 1R: TERM.BLOCKS, “INS. ONE MAN. NO.”
Procedure:	Click on any of the above boxes. Point to the insertion point. State insertion angle. Specify attribute values.

2.4.3 Conductor specifications

Graphical specifications in accordance with IEC 617-3. They are only decorative, that is, the information is not used by the subsequent CT program. The commands included in the group (boxes 1, 7, and 8), are described below and can be accessed from the Symbols section of the digitizer menu.

2.4.3.1 “Group of conductors”

Function:	This command is used on connection lines to specify the number of conductors. It is used most often in single-line diagrams. It can be used in two ways: 1. Number of “slashes” indicates the number of conductors. 2. One “slash” and a number indicates the number of conductors.
Access:	Box 1 above. Point on the application menu with the symbol shown in the diagram. Pulldown menu: Symbols, Specialsymb, Spec.Cond, Cond. Group
Procedure:	Point to a point on the line. Specify the angle of the conductor (0 or 90 degrees), default is 0 degrees. Specify the number of slashes. Specify a digit if the number of slashes was one.

2.4.3.2 Arrow

Function:	Simplifies the drawing of the arrows that point to the conductors specified by the symbol. It is used together with a symbol and is drawn from the symbol to the conductors specified by the symbol.
Access:	Box 7 above. On the application menu with the symbol shown in the diagram. Pulldown menu: Symbols, Specialsymb, Spec.Cond, Arrow
Procedure:	Point to the start point. Point to the conductors that the arrows are to point to, horizontally or vertically from the start point. Quit the command with Enter.

2.4.3.3 Marking

Function: When a wire dimension or other data are to be linked to a conductor, this is often done by drawing a line and a “slash” on the conductor to be specified. This function is intended to make it easy to draw these slashes and a line out to the text.

Access: Box 8 above. On the application menu with the symbol shown in the diagram.
Pulldown menu: Symbols, Specialsymb, Spec.conductor, Mark

Procedure: Point to the start point.
Point to the conductors on which the slashes are to be placed, horizontally or vertically from the start point.
Quit the command with Enter.

2.5 Connections\References, Conn\Ref.

2.5.1 Draft\Design

Function: Indicates which mode is active. Connections, symbols and references, and so on, will end up in the active layer group. Default is Design, in which case this text is marked and turned off. This function cannot be used without choosing line type first when the construction layer is on/active.

Access: Pulldown menu, Conn/Ref, Draft/Design
Digitizer menu 1R, LINETYPE/LAYERS, DRAFT/DESIGN

Procedure: Make accurate choice.

2.5.2 Line types\Layers

Function: This command changes layer and line types. There are six options on the application menu. Default on starting is 0.35mm under design (layer 2).

Access: Pulldown menu: Conn/Ref, Line/Layer
Digitizer menu 1R: LINETYPE/LAYERS,

Procedure: Make accurate choice.

2.5.3 Construction Layer

Function: Sets the construction layer to “active layer”, that is, the layer currently being worked on. This is the layer that is used for information that is not to be seen on the final plotted diagram. However, this information is important for the designer and for subsequent connection table software.
If terminal blocks are placed on this layer, for example, the line between the terminals of the block will be placed on the construction layer; this may be desirable if the terminal is unused and the line is not to be seen. With this layer active, it is not possible to change to draft layer before choosing a line type (see above).

Access: Pulldown menu: Conn/Ref, Line/Layer, Construct.Layers
Digitizer menu 1R: LINETYPE/LAYERS, CONSTR. LAYERS

Procedure: Click on the appropriate box.

2.5.4 Supplies (Electrical Sources)

Note: These functions are made for A3 drawings. However, they will work for other paper sizes if you stretch and move the inserted lines and symbols.

3-Phase, Vertical, Horizont.

Function: Help functions for quick drawing of 3-Phase supply, vertical and horizontal phase lines with references.

Access: Pulldown menu: Conn/Ref, Supply
Digitizer menu 1L, 2L: SUPPLY, 3-PHASE HORIZ/SUPPLY VERTICAL/SUPPLY HORIZ.

Procedure: Choose the command.

2.5.5 One connection line

Function: The connection line command is a function that draws connections in the form of lines between connection lines on devices and other such connection lines.
The advantage over drawing lines manually is that only the start and end points need to be given. When a point is specified, the system provides a sight that automatically finds the correct connection point (that is, searches for a connection point or another conductor). If there is no conductor or connection point in the sight, the exact point is taken. All connection lines can be repeated, that is, the function can be repeated by pressing ENTER/SPACE after it has been selected once on the menu. Pressing ENTER or SPACE on point selection gives the last point specified. This feature can be used to make several connections consecutively.
The start or end point may be a connection point, a point on a connection line, an end point on a connection line, an intersection between lines, or a free point.
The connection automatically continues in the same direction as the connection point of a symbol or the end point of a connection line unless the end point is behind.

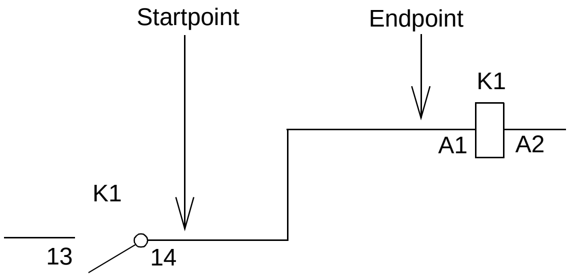


Figure 2-6. Example 1 - One Connection Line

Function: If the start point or end point is positioned on a connection line, the function will automatically make a connection and insert a connection point.

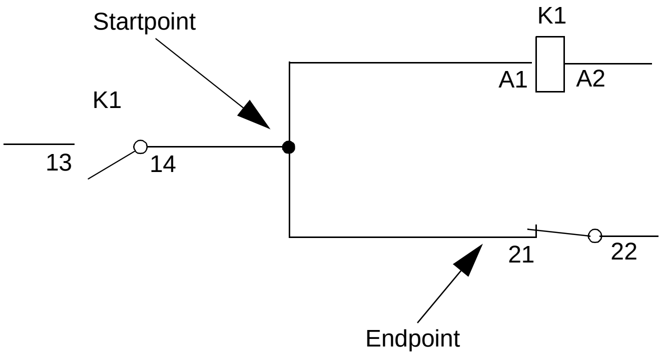


Figure 2-7. Example 2 - One Connection Line

Function: A single connection point can hence be created by entering a start point on a connection or in an intersection and then finishing the command by pressing ENTER.
A connection to an intersection should be done in two steps. Starting in the intersection, make a first connection in the required X- or Y-direction. Then, connecting to the end point, continue the connection line. This is because the function will not manage to automatically choose the right direction when starting in an intersection.
When the startpoint and the endpoint both are free points (not on a connection line or connection point), the first line will be drawn in the X-direction.

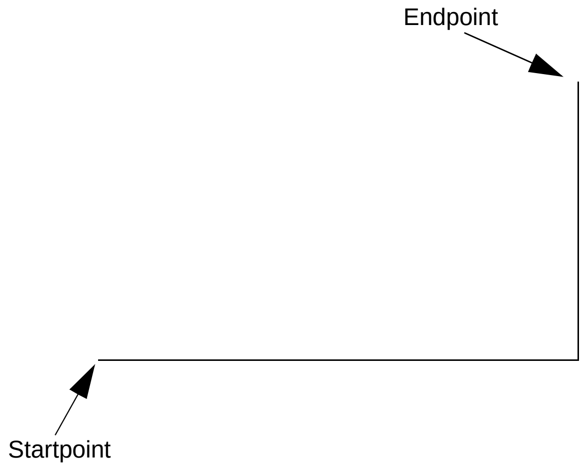


Figure 2-8. Example 3 - One Connection Line

Function:	Note that this function will automatically convert separate sequential lines to one single line if they are in the same direction when you connect to an “old” connection line. This reduces faults in the subsequent connection table.
Access:	Pulldown menu: Conn/Ref., One connection Digitizer menu 1R: CONN.LINES, ONE CONN.LINE
Procedure:	Point to the start point Point to the end point.

2.5.6 Free connection line

Function:	This command is used to draw a conductor manually. The command starts the AutoCAD command “LINE”.
Access:	Pulldown menu: Conn/Ref, Free Conn. Digitizer menu 1R: CONN.LINE, FREE CONN.LINE
Procedure:	Point to the start point. Point to the “to” point. Press “RETURN” after the last “to” point.

2.5.7 Multiple connections

Function: Creates a number of parallel connection lines in the x-y or y-x direction. The connection lines will have a fixed distance between them at the start point and the same or another fixed separation distance at the end. The lines may be separated in both the x- and y-direction. That is, the start points of two parallel lines have different x and y coordinates.
If the x and y coordinates of both the start points and the end points differ, the direction of the connection will be oriented in the x-direction from the start point.
If the start or end point is on another connection, a connection point is automatically created.

Access: Pulldown menu: Conn/Ref, Mullet. conn.
Digitizer menu 1R: CONN.LINE, MULT. CONN.LINE.

Procedure: Point to the start point.
Give the pitch at the startpoint by pointing.
Point at the end point.
Give the pitch at the end point by pointing.
Enter number of conductors.

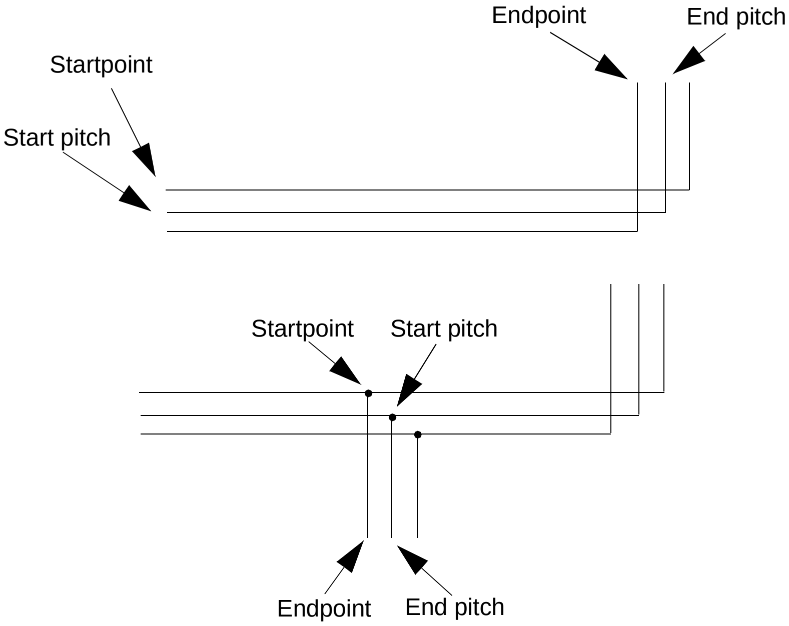


Figure 2-9. Example - Multiple Connections

2.5.8 Cable

Function: Draws cable symbol in a connection diagram.
Note that this symbol is a decorative (drafting) symbol only.

Begin by pointing to the start point, which is the start point of the first conductor. Specify the start point of the last conductor as the second point. The distance between these points is a multiple of 5 (5 = distance between box terminals). This is easy since the grid is 5.

In this command you do not specify the number but the extent, and this automatically gives the number. The direction and length of the line to which all conductors are to be brought together is then specified as a line of direction and length orthogonal with respect to the start point of the first conductor, mentioned above. Finally, specify the start number for the first conductor; the conductors are then numbered automatically.

Access: Pulldown menu: Conn/Ref, 'Cable'
Digitizer menu 1R: CONN.LINE, “icon”

Procedure: Point to the first start point.
Point to the last start point.
Specify direction and length.
Specify start number for numbering.

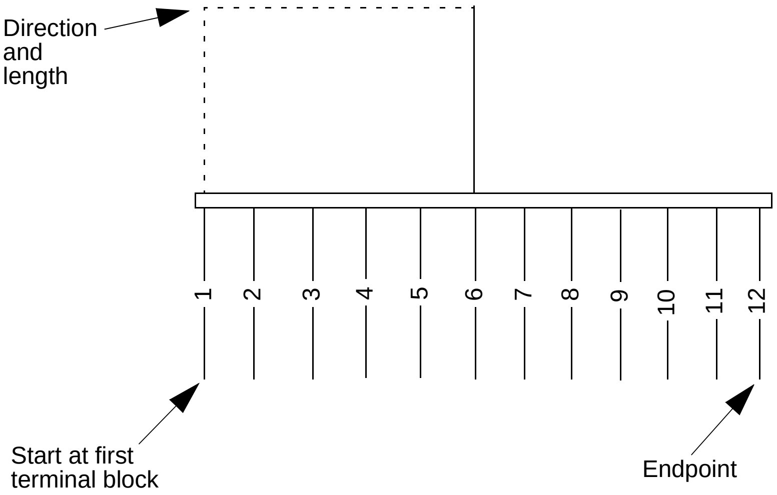


Figure 2-10. Example - Cable

2.5.9 Mechanical link

Function: Draws a mechanical link between, for instance, a coil and a contact with an attached description.

The first point must be a "receptive" connection point in which there are places on the contacts and coils where a mechanical link is possible. If the start point or end point is on another link, the function creates a coupling point. The important thing for connection-table generation, if used, is that the link should lay on top of the symbol so that it is given the correct item designation. Hence, it is not necessary to point to or stop at a contact that is included, but the line should be drawn across the symbol.
Undo can be used from the screen menu to undo the last line segment.

Access: Pulldown menu: Conn/Ref, Mech. Link
Digitizer menu 1R: CONN.LINE, MECH.LINK

Procedure: Point to the start point.
Point to corners.
Point to end point.

2.5.10 One Reference

Sheet references are used to link conductors that run from one sheet to another, or within the same sheet or within boundary lines, without drawing a conductor between them.

2.5.10.1 DIAGR/SHEET

Function: This command is used to name a conductor and state which sheet it continues on. This information identifies a connection point.
The application menu and screen menu offer the option of drawing a bracket, but if CT generation is to be used, each conductor must have a reference, and the bracket is only decorative. See the "Ins.row" function below to insert a line of references and to set a row of sheet references.
The format for CT generation is: diagram: sheet/col.
Sheet is mandatory, diagram is mandatory if it connects to another sheet, and column is decorative.
Example 1: 123-XX:34/B
Example 2: 34 within the same circuit diagram.

Access: Pulldown menu: Conn/Ref, One ref, Diagr/Sheet
Digitizer menu 1R: REFERENCES, DIAGR./SHEET

Procedure: Choose the command.
Point to the insertion point, that is, the connection line.
Specify the name of the conductor, which is only a name (same at both ends).
State which drawing sheet the other connection line is on.

2.5.10.2 SIGNAL

Function: Use this command to name a conductor that continues on the same sheet or falls within the same boundary frame. “SIGNAL” also links conductors within boundary frames with the same item designation on different sheets. Thus the entire name of the “SIGNAL” reference is the item designation plus the signal name, if it is within a boundary frame.

Access: Pulldown menu: Conn/Ref, One ref, Signal
Digitizer menu 1R: REFERENCES, SIGNAL

Procedure: Point to the insertion point, that is, a terminal point on the connection line.
Specify the signal name.

2.5.10.3 SUPPLY

Function: Use this command to name a conductor that appears on several drawing sheets. The application menu and screen menu offer the option of drawing a bracket. Often this reference can be used instead of the diagram/sheet reference.

Access: Pulldown menu: Conn/Ref, One ref, Supply
Digitizer menu 1R: REFERENCES, SUPPLY

Procedure: Point to the insertion point, that is, a terminal point on the connection line.
Specify the signal name.

2.5.11 Insertion of line, diagram/sheet reference

Function: Specifies a diagram/sheet reference. Automatically draws brackets and moves all sheet numbers except one to the construction layer ($CON).

Access: Pulldown menu: Conn/Ref, Line Diagr/Sheet
Digitizer menu 1R: REFERENCES, “icon”

Procedure: Specify drawing sheet number.
Enclose all terminal points within a “window”.
Give the signal name as the function requests and point out the current conductor with a cross.

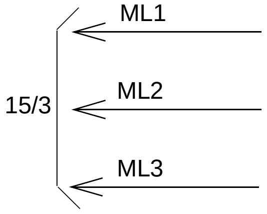


Figure 2-11. Example - Insertion of Line, Diagram/Sheet Reference

2.5.12 Brackets

Function:	Creates a bracket to be used, for example, around a number of conductors with references. This bracket is only decorative. A reference must always be placed on each conductor.
Access:	Pulldown menu: Conn/Ref, Brackets Digitizer menu 1R: REFERENCES, "BRACKET" Point to the top/left end of the bracket. Point to the bottom/right end of the bracket. Specify the direction of the bracket relative to one end (start or end point).

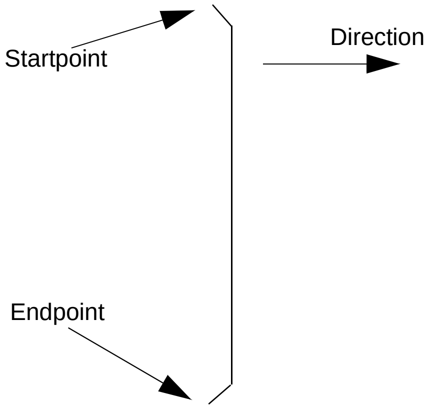


Figure 2-12. Example - Brackets

2.5.13 Construction information

In the Electrical Diagram Builder Circuit, it is possible to link information and different types of control codes to a net or terminal which then influences, or is simply transferred to, the connection table program.

Important hint: This information is currently not used within AdvaBuild!

Net information is information that can be linked to a net (a point with common potential). Note that terminal and net are shared in the Electrical Diagram Builder Circuit since terminals must have a 1-side and a 2-side.

Net information is inserted in the form of a block that is given certain values. These values describe the type of information and its value. The block consists of a cross on the designer layer and a text.

Terminal data is information that can be linked to a terminal or to a symbol that owns the terminal.

Terminal information is inserted in the form of a block that is given certain values. These values describe the type of information and its value. The block consists of a cross and a circle on the designer layer.

NET DATA BLOCK

Function: Inserts a block that may have one or more of the types of information listed below. This facilitates the work for those users who always use more than one information-code in the same net. The block name is “ANETMULT”. It contains the information for voltage class and wiretype by default.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Net data block
Digitizer menu 1R: NET DATA, NET DATA BLOCK

Procedure: Point to the insertion point of a conductor.
Enter the values.

WIRE TYPE

Function: Sets the wire type that is used at a net. A question mark can only be used to list wire types if InternalCT is installed.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Intern, Cord type
Digitizer menu 1R: NET DATA, CORDTYPE

Procedure: To change the current wire type, enter “C” (core type) or “?” to list all codes.
Accept the current wire type (core type) with X (or simply “RETURN”).
Point to all terminals (nets).
Press “RETURN”.

INSTRUCTION, INSTR.

Function: Prints out net information from the connection table in column form.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Intern, Instr.
Digitizer menu 1R: NET DATA, INSTR.

Procedure: Click on “INSTR.”
Enter the instruction.
Point to the terminals.

REMARK

Access: Pulldown menu, Conn/Ref, Constr.Inf, Intern, Remark.
Digitizer menu 1R, NET DATA, REMARK

Procedure: Click on “REMARK I”
Enter the remark.
Point to the terminals.

CABLE CODE

Function: Indicates the type of cable to be used.
The structure of the code is as follows:
size or current/cable code/cable control/shield or ground/number.

Explanation: Size is cable area, for example 0.5. Current is followed by A, for example 1A; current and size are mutually exclusive. Cable code is a designation for a particular type of cable in the database. The first character must be C, S, or P, where C stands for control cable, S for shielded cable, and P for power cable. Up to two other characters may be used to direct the core to a particular cable with desirable properties. Cable control is an arbitrary identity, for example AA, which directs all cores with the same cable code and cable control into the same cable. This is useful where there are problems with interference.

Shield or ground is used to specify which code is shield “S” or ground “G”. Number is used to specify a given twisted pair. The value 1 on two cores, for example, places these in the same twisted pair, no. 1.
An example of a complete cable code: 0.5/S2/AA/S/1. To specify only S2, use /S2//.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Extern, Cable code.
Digitizer menu 1R: NET DATA, CABLE CODE

Procedure: Click on “CABLE CODE”.
Enter new codes, I/C/F/S/G/N/X.
When the cable code is complete, enter X or “RETURN”.
Point to the terminals (nets) that are to be given the code.

VOLTAGE CLASS

Function: This command sets the voltage class of the net. It may be used to choose a suitable cable.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Extern, Volt. class
Digitizer menu 1R: NET DATA, VOLTAGE CLASS

Procedure: Click on “VOLTAGE CLASS”.
Enter the voltage class.
Point to the terminals.

NET NUM.

Function: This function makes it possible to give the net a unique identity.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Net.No.
Digitizer menu 1R: NET DATA, NET NO.

Procedure: Enter a net number.
Point to the terminal.
End with RETURN.
Item Designation.

ITEM DESIGNATION CABLE, ITEM DESIG.

Function: Tells cabling functions which item designation to choose, if there is more than one.
Value: + and = for item designation and functional item designation respectively.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Item Des.
Digitizer menu 1R: CONN.DATA, ITEMDESIG.

Procedure: Point to the terminal point.
Enter the value for the information.
This command allows you to place several information blocks in which the value is retained as the default value. It is ended with Enter, or by pointing to a blank area.

TERM. FORM

Function: States the form of the terminal.

Access: Pulldown menu: Conn/Ref, Constr.Inf, Term.Form
Digitizer menu 1R: CONN.DATA, TERM.FORM

Procedure: Click on “TERM. FORM”.
Point to the terminal.
Enter the value.
This command allows you to place several information blocks in which the value is retained as the default value. It is ended with Enter, or by pointing to a blank area.

1/2-SIDE

Function: Given to terminals to specify which is the 1-side and which is the 2-side. This applies to all terminals except those with centered text that already have a 1-side and a 2-side.

Access: Pulldown menu: Conn/Ref, Constr.Inf, 1/2 side
Digitizer menu 1R: CONN.DATA, 1/2 SIDE

Procedure: Click on “1/2-SIDE”.
Point to the terminal.
Enter the value for the information.
This command allows you to place several information blocks in which the value is retained as the default value. It is ended with Enter, or by pointing to a blank area.

2.5.14 Connection control

Function: Allows you to control the “sewing” of the cable cores between the terminals. You can control one level radial, or the sequence in which the terminals are to be sewn. There is no need for the entire net to be controlled.
The command is used in the same way as terminal info., but you must not specify any values. If the designer layer is showing, you can see how sewing of a net is controlled. With radial control on one level, the root has the value 0 (zero) and all others have the value 1. With sequence control, the first terminal has the value 0, and subsequent ones have the values 1, 2, 3, 4..., and so on.

Access: Pulldown menu: Conn/Ref, Conn.control
Digitizer menu 1R: CORD DATA, CONN.CONTROL

Procedure: Activate the command.
Choose radial or sequence.
Point to the terminals in the correct order: to the root first for radial control; in the order of sewing for sequence control.

2.5.15 CONN. ZERO NO.

Function: Function:Decorative “zero numbering” in the diagram that is intended for those users who do not generate connection tables or who want to manually insert part number after the table generation.
This function can be used in one of two ways. If you are referencing a single net-section, that is, one conductor, you point to the conductor. If there are multiple parts, you point to the connection points.

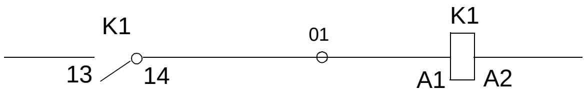


Figure 2-13. Example 1 - Connection Zero Number

Function: The function will ask for a start number every time it is used and will automatically increase the value each time you point to a line. Every other time you point to a connection point, it will automatically assign the same value to two connection points.

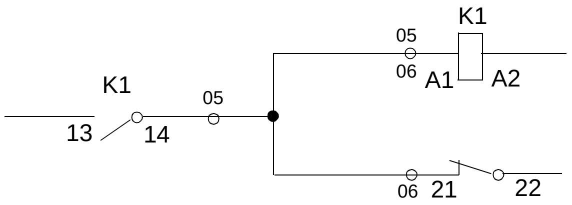


Figure 2-14. Example 2 - Connection Zero Number

The user is also provided with the possibility to move the value, since two values may occur in one connection point with more than one part interconnecting.

Access: Pulldown menu: Conn/Ref, Zero No
Digitizer menu 1R: CORD DATA, CONNECT. ZERO NO

Procedure: Enter startnumber.
Point to the line or connection point.
Move value or continue with ENTER.
Point to next insertion point or end with enter.

2.6 Boundary Frames

There are six different commands for drawing boundary frames. The differences between them are the line type they are drawn with and their number of item designations, location-oriented item designation only, or both location- and function-oriented item designation. The frame with the single-dot-dash line is normally used for specifying details of a device in accordance with IEC standards.

The boundary frame with the double-dot-dash line is used when the item designations for the symbols within the frame are not to be combined with the sheet-common item designations (Doc80) or outlying frames.

2.6.1 1 Item des, 2 Item des.

Function: Choose one or two item designations, and specify either position-orientation or both position- and function-orientation.

Access: Pulldown menu: Frames, 1 Item des/2 Item des.

Procedure: Select and mark any that are not marked already.

2.6.2 Line types for frames

Function: Draw a boundary frame with 4 or more corners with selected linetype and one or two item designations. One designation is always the location-oriented item designation (L). Two is both function-oriented and location-oriented item designation (F+L).

Access: Pulldown menu: Frames.
Digitizer menu: BOUNDARY FRAMES.

Pulldown menu: Select first one or two designations.
Digitizer menu: Choose command row, the commands marked “L” or the commands marked “F+L”.
Choose boundary frame with the desired linetype.
Point to the insertion point (upper right corner).

Frames with four corners:

Specify the bottom right corner.
Give an item designation or designations.

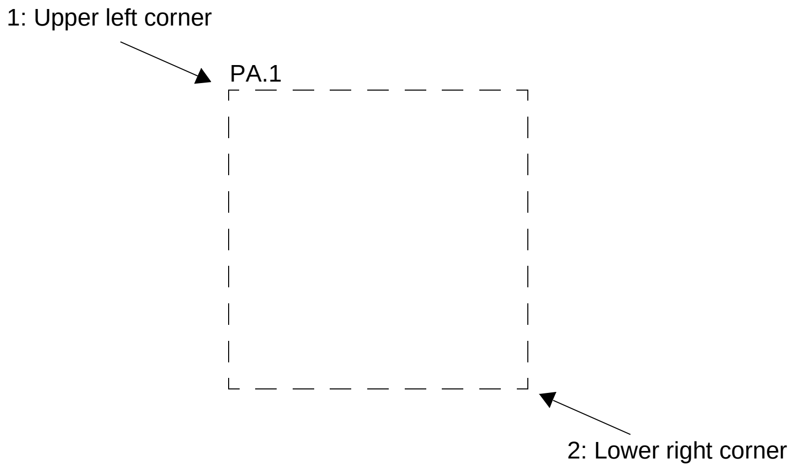


Figure 2-15. Example 1 - Frames

Procedure: Frames with more than four corners:
Specify the corners in sequence, the first point after the upper left corner must be specified without any distance in the y-direction.
Give an item designation or designations.

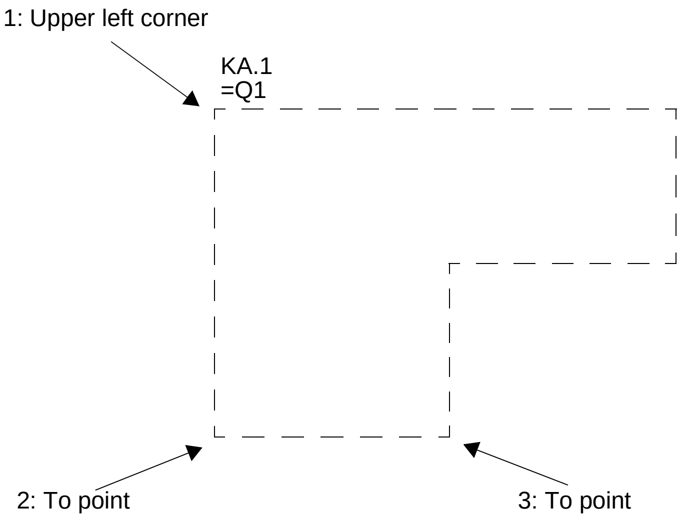


Figure 2-16. Example 2 - Frames

Undo and close can be used from the screen menu (not the keyboard) to undo a line or close the frame after the last point.

2.6.3 Connection Points, Conn. Pt.

Text-R, Text-L

Function:	Places a connection point with a cross in a boundary frame serving as a macrobox/function unit or “black box”. The frame must be given a decorative content (decorative symbol or text). This command can be used to create connection points to the macro symbol. The same effect can be obtained with terminals, but this symbol is more convenient since it is a ready-made unit.
Access:	Pulldown menu: Frames, Conn.Pt, Text-L/Text-L Digitizer menu 1R: BOUNDARY FRAMES, “Icons”
Procedure:	Point to an insertion point within the box. Specify the angle. Specify the item designation. Specify the terminal designation.

2.6.4 SHEET-COMMON ITEM DES.

Function:	When everything on a sheet is in the same unit, this block of information is used to give a prefix (for example, the cubicle name) to the item designation of all units. You can specify both function-oriented and location-oriented item designation.
Access:	Pulldown menu: Frames, Common Item Des. Digitizer menu 1R: BOUNDARY FRAMES, SHEET COMMON ITEM DESIGNATION
Procedure:	Position the block. Give a value to the function-oriented and location-oriented item designation.

2.7 Modify

2.7.1 Change Layers

Function:	This command makes it possible to change the parameters for Layer name, On/off, Color, Linetype, and so on (see AutoCAD manual). A new layer can be added with this command as well. In the interest of compatibility with other systems (users), you should avoid changing anything other than color on an existing layer.
Access:	Pulldown menu: Modify, Layers... Digitizer menu 1R: LINETYPE/LAYERS, CHANGE LAYERS
Procedure:	Change values. Press OK/CANCEL.

2.7.2 Remove Symbol

Function: Erases a diagram symbol and automatically mends underlying connection lines.
Diagram symbol refers to a symbol that has connection points.
This command is especially useful when a symbol is to be replaced.
Remove symbol is a repeating command.

Access: Pulldown menu: Modify, Remove Symb
Cursor menus 2: Remove Symb

Procedure: Select ONE symbol.

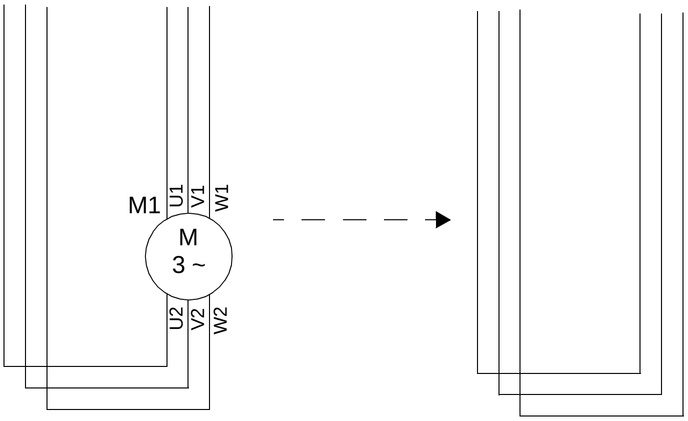


Figure 2-17. Example - Remove Symbol

2.7.3 Frame-side off

Function: Turn off one side in a boundary frame. The function changes the layer of the line to the construction layer.

Access: Pulldown menu: Modify, Frame-side off

Procedure: Select one side of the boundary frame.

2.7.4 EDIB.Move

With connections

Function: Moves a symbol with its electrical connections unchanged, that is, the connections follow the move on the rubber-band principle. By surrounding several symbols with the window that is available, it is a simple matter to move large parts of the drawing. Objects inside the window are moved, and those that cross the edge are stretched.

Access: Pulldown menu: Modify, EDIB.Move, With conn.
Digitizer menu 1R***:*** CHANGE & MOVE, MOVE COMP. WITH CONN.LINE

Procedure: Position the window around the object(s) to be moved.
Point to the base point for the move.
Point to the new base point.

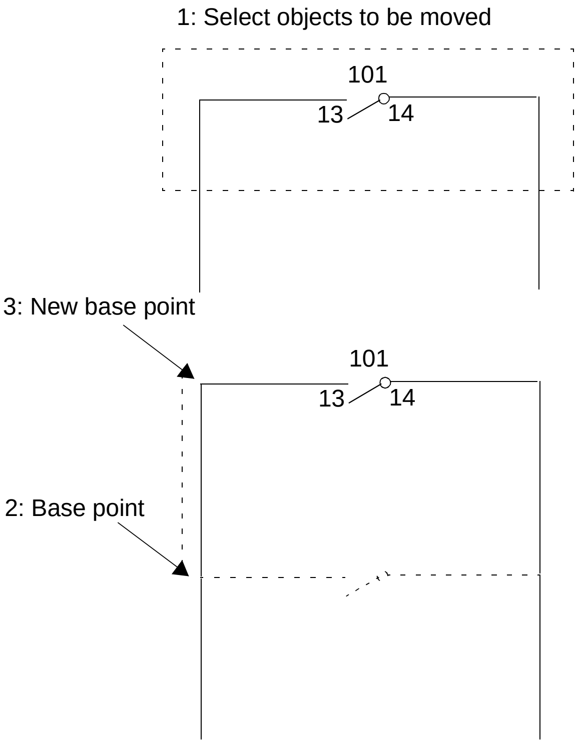


Figure 2-18. Example - EDIB.Move

Text/Symb.

Function: Efficiently moves text or symbol without having to provide a start point. You can move the text/symbol either by pointing to the insertion point or by using the screen command that moves the text/symbol ±2.5 snap in the X- or Y-direction.

Access: Pulldown menu: Modify, EDIB.Move, Text/Symb
Digitizer menu 1R: CHANGE & MOVE, MOVE TEXT, SYMBOL

Procedure: Point to the object.
Point to the new insertion point or select the appropriate steps from the screen menu.

Connection

Function: After one or more symbols have been moved with the “MOVE COMP.” command, the connections take the shortest route from the start point to the end point on the rubber-band principle. If, as a result, the lines are no longer orthogonal (right-angled), they can be adjusted with the “MOVE CONN.” command.
Start by pointing to the conductor to be adjusted. The conductor will be divided into two lines at the point indicated. Then point to the new point, so that the lines form right angles. Sometimes the “Ortho” function must be off as it may make the “MOVE CONN.” command difficult to use.

Access: Pulldown menu: Modify, EDIB.Move, Conn.
Digitizer menu 1R: CHANGE & MOVE, MOVE CONN:

Procedure: Point to the line to be changed.
Point to the new corner point.

MOVE TEXT UP

Function: Use this command to move a line of text up 1 millimeter.
SELECT: Point to the text line to be moved.
LAST: Moves the last text entered.

Access: Pulldown menu, Modify, EDIB.Move, Text Up
Digitizer menu 1R, CHANGE & MOVE, MOVE TEXT 1 mm UP

Procedure: SELECT: Click on the “SELECT” box.
Point to the line of text.
LAST: Click on the “LAST” box.

2.7.5 Design – Draft

Function: Checks and shows whether an object is placed on the design layer group. Also makes it possible to move objects from the design layer to the draft layer.

Access: Pulldown menu: Modify, Design->Draft
Digitizer menu 1R: CHANGE & MOVE, DESIGN>>DRAFT

Procedure: Select the object to be checked, that is, with windows. Objects that are on the draft layer become marked.
Cancel or select the object that should be moved. Press Enter to move the object selected in step 1.

2.7.6 Draft – Design

Function:	Checks and shows whether an object is placed on the draft layer group. Also makes it possible to move objects from the draft layer to the design layer.
Access:	Pulldown menu: Modify, Draft->Design. Digitizer menu 1R: CHANGE & MOVE, DRAFT>>DESIGN
Procedure:	Select the object to be checked, that is, with windows. Objects on the draft layer become marked. Cancel or select the object that should be moved. Press Enter to move the object selected in step 1.

2.7.7 Edit Text

Use the DDEDIT AutoCAD command to edit a particular section of draft (decorative) text (see AutoCAD manual).

2.7.8 Change Text

Function:	Use this command when part of a text is to be changed. It offers a simple way of editing a text by pointing to it, specifying the text string to be replaced (a section of the text), and entering the new text. CHANGE TEXT is a repeating command.
Access:	Pulldown menu: Modify, Change text Digitizer menu 1R: DECORATIVE TEXT, CHANGE TEXTS
Procedure:	Point to the text or texts to be edited. Specify the text to be replaced. Enter the new text.

2.7.9 Edit attribute. Value

Function:	Used for editing the attribute values of a block: for example, a socket or an item designation. This command also accesses attributes that have no value and are therefore not seen.
Access:	Pulldown menu: Modify, Edit Designation, Value Digitizer menu 1R: EDIT ATTRIBUTE, VALUE
Procedure:	Select block (symbol). Change the attribute.

2.7.10 Edit attribute. Position

Function: Used to change the insertion point in a symbol attribute: for example, a socket or an item designation.

Access: Pulldown menu: Modify, Edit Designation, Position
Digitizer menu 1R: EDIT ATTRIBUTE, POSITION
Select a symbol attribute.
Point to the new insertion point of the attribute.

2.7.11 Edit attribute. Angle 0+Position

Function: Used for editing the insertion point of a symbol attribute (for example, a socket or an item designation), while at the same time setting the angle to zero degrees.

Access: Pulldown menu: Modify, Edit Designation, Angle 0-Posit.
Digitizer menu 1R: EDIT ATTRIBUTE, ANGLE=0+POSIT.

Procedure: Point to ONE attribute.
Point to the new insertion point of the attribute.

2.7.12 Edit attribute. Angle

Function: Used for editing the angle of a value or an attribute in a symbol, for example, a socket or an item designation.

Access: Pulldown menu: Modify, Edit Designation, Angle
Digitizer menu 1R: EDIT ATTRIBUTE, ANGLE.

Procedure: Point to ONE attribute.
Enter the new insertion angle of the attribute.

2.7.13 Global Edit.

Function: Changes a specified part of the item designation on all objects in the drawing that have that part in their item designation. For example, SA1.U1 can be changed to SA2.U1. Note that all item designations that have SA1 will be changed.

Access: Pulldown menu: Modify, Edit Designation, Global edit.
Digitizer menu 1R: EDIT ATTRIBUTES, GLOBAL EDIT

Procedure: Specify the part of the designation that is to be changed.
Enter a new string.

2.7.14 Show/Hide Item Designation

Function: Toggles item designations on and off by moving them between different layers (AutoCAD command). The function shows all item designations that are hidden and hides all those that are shown. This function is used, for example, to place a terminal in a terminal row and hide its designation.

Access: Pulldown menu: Modify, Show/Hide Item Des.
Digitizer menu 1R: EDIT DESIGNATIONS, SHOW/HIDE ITEM DES.

Procedure: Point to the symbol for which the item designation should be shown or hidden. Choose whether it is the function-oriented or the location-oriented designation that is to be shown, F or L.

2.7.15 Change to Construction Layer

Function: Moves a designation to the construction layer.

Access: Pulldown menu: Modify, To Constr.Layer
Digitizer menu 1R: EDIT DESIGNATIONS/TO CONSTR. LAYER

Procedure: Point to the designation to be moved.

2.7.16 Edit terminal block rows

Function: Changes the designation of one or more terminals in a terminal row. This function has the convenient facility of also changing designations that cannot be seen on the screen because their layers are turned OFF. It also changes all designations in one command. The function can be used on other apparatus or symbols, in which case it assigns the same item designation to the symbols affected.

Access: Pulldown menu: Modify, Edit Term. Row
Digitizer menu 1R: EDIT DESIGNATIONS/EDIT TERM.BL.ROW ID.

Procedure: Choose the terminals to be changed.
Specify a new designation for the terminal row.
Confirm the change for each terminal.

2.7.17 Edit Sheet References

Function: Changes the sheet reference on a row or series of diagram/sheet references.

Access: Pulldown menu: Modify, Edit Sheet Ref.
Digitizer menu 1R: EDIT DESIGNATIONS/ EDIT SHEET NO:

Procedure: Choose the references to be changed.
Specify new sheet notation.
Verify all notations that are to be changed.

2.7.18 Edit Apparatus

Function: Use this function to go through all symbols that correspond to an apparatus in the current drawing sheet. It is possible to go backwards and forwards through the symbols and edit all values for every symbol if you wish.

Access: Pulldown menu: Modify, Edit Apparatus
Digitizer menu 1R: EDIT DESIGNATIONS/ EDIT APPARATUS

Procedure: The active symbol is marked with a cross.
Enter: E (edit value), N (next symbol), P (previous symbol), or X (exit).

2.8 Design Drawing

2.8.1 Text

Set height 1.8, 2.5, 3.5, 5.0, 7.0

Function: Sets the height of decorative text. Default height is always the height last used in the drawing or, for a new drawing, 2.5.

Access: Pulldown menu: Draft draw., Text, Set height
Digitizer menu 1R: DECORATIVE TEXT, SET HEIGHT

Procedure: Point to the box with the selected text height on the application menu or the screen menu.

Inserting text with justifying to: Left, Center, Middle, Right.

Function: Use the commands below when entering text.

Left: The text will be to the right of the start point.

Center: The first line of text will be positioned horizontally around the center point and vertically above the point.

Middle: The first line of text will be positioned horizontally around the center point and vertically on the point.

Right: The text will be to the left of the start point.

Access: Pulldown menu: Draft draw., Left/Center/Middle/Right
Digitizer menu 1R: DECORATIVE TEXT, Left/Center/Middle/Right

Procedure: Point to the insertion point.
Specify the direction of the text in degrees (“Return” gives 0 degrees).
Enter text.
Finish with “RETURN” on a blank line.

2.8.2 Change style

Function:	Changes the text font of decorative text. The function changes text created with style STANDARD, TERMINALS, ITEMDES
Access:	Pulldown menu: Draft draw., Change style, Simple Digitizer menu 1R: DECORATIVE TEXT, SIMPLE STYLE (TXT)
Procedure:	Choose the command.

Fine

Function:	If the user chooses “FINE STYLE”, the font style for the drawing will be replaced with the AutoCAD standard font SIMPLEX or ISO. SIMPLEX is a broad proportional font; ISO is a simpler non-proportional font which adheres to ISO standards.
Access:	Pulldown menu: Draft draw., Change style, Smelts Digitizer menu 1R: DECORATIVE TEXT, FINE STYLE (ISO)/(SIMPLEX)
Procedure:	Choose the command.

2.9 Maintenance and settings

2.9.1 CONFIGURATION

Function:	A dialog box in which the user can change certain values and variables that control the drawing environment in different ways, see below. The configuration consists of two parts. One is general for the Diagram Builder and is described in the “Diagram Builder Reference Manual, chapter 2.19” and the other is Electrical Diagram Builder Circuit specific and is described below. These changes are saved in the drawing and do not have to be repeated. It is also possible to save a configuration in a separate file for a project and use it in other drawings. The most common routine is to make the appropriate changes in the initial drawing in order to get the right configuration automatically when creating a new drawing. Remember though that when using an old drawing as a foundation for a new one you might have to reconfigure it.

The following properties are configurable in the Electrical Diagram Builder Circuit:

Number of item designations in apparatus.

A control of the number of item designations used when inserting apparatus-symbols. One (1) prompts the position-oriented item designation. Two (2) prompts both the position- and the function-oriented item designation. The function-oriented item designation will be placed closest to the symbol and the position-oriented on top of the function-oriented.

NOTE: Programs using the drawing, like the FT-generator, interpret different item designations in different ways and assume that they are used correctly.

Default: 1

Prompt for apparatus data

This function is a control of the questions that are asked at insertion of apparatus symbols. If turned OFF, the questions “type, remark 1 & 2” will not appear. It should be turned OFF. Information on these attributes is not presently used.

Default: OFF

Access:	Digitizer menu 1R: SETTINGS, CONFIG Screen menu: MLCONFIG, CONFIG
Procedure:	Change values Press “OK”.

2.9.2 MSC. Settings

In the following you find a number of settings that, like configurations, are valid for the whole drawing and should be made in the initial drawing in order to affect a whole project.

Contact styles

Function:	Toggles between different appearances of the contacts, with or without a “ring”.
Access:	Digitizer menu 1R: SETTINGS, MISC SETTINGS, Contact Screen menu: MSC.SET, Contact

2.9.3 FORMAT

Function:	A command to reach the common format functions in the Diagram Builder, affecting definitions and choices of formats. NOTE: It is possible to automatically insert a form in the Diagram Builder configuration.
Access:	Digitizer menu 1R: FORMAT Screen menu: FORMAT
Procedure:	See Diagram Builder description.

2.9.4 Symbol library

Table 2-4. Symbol Library

Symbol Type	Library
Function unit, function group	UNITS
Sensors, non el. input	SENSORS
Passive components	PASSCOMP
Digital unit, I/O	I_O_UNIT
Protection device	PROTECT
Current and voltage source	SOURCE
Signal device	SIGNAL
Contacts	CONTACTS
Coils	COILS
Inductors	INDUCTORS
Motors	MOTORS
Measuring instruments	INSTRUM
Power circuits	POW_CIRC
Switches, mechanical or static	SWITCH
Transformers	TRANSF
Transducers	TRANSDUC
Semi-conductors	SEMICOND
Conductors	CONDUCT
Connectors	CONNECT
Pilot-switches	PILOTSW
Combination of inductors, condensators, resistors	FILTERS
Qualifying symb acc. to IEC617-2	QUALIF
Single line	SINGLE
Cross reference	XREF
Application specific symbols	APPLIK

2.9.5 Layer system

In the Electrical Diagram Builder Circuit there are different layers to differentiate between different types of objects and to enable the use of different line types and colors. Layers can be compared with a number of overhead films on top of each other, where each film is assigned a different color and line type.

Layers in the Electrical Diagram Builder Circuit can be divided into different groups.

1	Used for the form and the drawing head.
2-13	Design layer. Used for connection lines and boundary frames and so on.
102-113	Draft layers with exactly the same properties as the corresponding layers mentioned above.
150-160	Decorative layers used for drawing objects (lines, circles, and so on) in symbols.
$tmp,$con	Construction layer used to show the designer certain information that is not wanted on the copy sent to a “client”.
node	Layer used for certain points in symbols. Should be turned OFF before plotting.
node_i	Layer used for objects that are normally invisible. This is used for connection points in symbols, interpreted by the EPS-generator.
$app,$a_rem	Layer used for apparatus information. $app contains those attributes that are normally invisible. $a_rem contains information that should normally be shown, for example one or both of the comments.
$mklnk	Layer used for mechanical links.
$cref	Layer containing the cross reference.

2.9.6 Layer list (default settings)

Table 2-5. Layer List (Default Settings)

Layer Name	State	Color	Line Type
0	On	7 (white)	CONTINUOUS
1	On	7 (white)	CONTINUOUS
2	On	7 (white)	CONTINUOUS
3	On	6 (magenta)	CONTINUOUS
4	On	7 (white)	HIDDEN
5	On	6 (magenta)	HIDDEN
6	On	5 (blue)	DASHDOT

Table 2-5. Layer List (Default Settings) (Continued)

Layer Name	State	Color	Line Type
7	On	5 (blue)	DIVIDE
8	On	4 (cyan)	CONTINUOUS
9	On	1 (red)	CONTINUOUS
10	On	4 (cyan)	CONTINUOUS
11	On	4 (cyan)	CONTINUOUS
12	On	4 (cyan)	CONTINUOUS
13	On	6 (magenta)	CONTINUOUS
102	On	4 (cyan)	CONTINUOUS
103	On	3 (green)	CONTINUOUS
104	On	4 (cyan)	HIDDEN
105	On	3 (green)	HIDDEN
106	On	4 (cyan)	DASHDOT
107	On	4 (cyan)	DIVIDE
152	On	7 (white)	CONTINUOUS
153	On	6 (magenta)	CONTINUOUS
NODE	On	7 (white)	CONTINUOUS
NODE_I	Off	7 (white)	CONTINUOUS
$APP	Off	2 (yellow)	CONTINUOUS
$CON	On	2 (yellow)	CONTINUOUS
$OFF	Off	1 (red)	CONTINUOUS
$MKLNK	On	7 (white)	HIDDEN
$TMP	On	2 (yellow)	CONTINUOUS
$A_REM	On	2 (yellow)	CONTINUOUS
$CREF	On	3 (green)	CONTINUOUS

2.9.7 Text styles

In the Electrical Diagram Builder Circuit, specific text styles are used for different designations/attributes. These can be changed individually and assigned different text fonts. NOTE that when the text height of a style is changed, this will not affect symbols already created that contain attributes in that specific style.

ITEMDES	A text style used for item designations. Fix height 2.5.
TERMINALS	Text style used for connection designations. Fix height 2.5
CREF	Text style used for cross references.

2.9.8 Special blocks

The Electrical Diagram Builder Circuit contains a number of blocks that the user may want to change or manipulate in different ways. This may be true for our users who may have different national needs.

DOT	Block used for the dot that is inserted by the connection-line commands. The block can be redefined without affecting the system.
702*	A number of blocks that are all used as parts of contacts. This is designed in order to enable redefinition of contact with and without circles or rings.

Chapter 3 Apparatus and symbols - Menus 1L, 2L, 3L.

The symbols offered on Digitizer menus 1L, 2L, and 3L are explained in this chapter. The type of symbol is described here, as well as the apparatus category and any comments. Where symbols look the same (for example, relay contacts and contactors), the difference is not seen until lists are generated from the apparatus list program.

3.1 Menu 1L and Menu 2L.

The functions of Menu 1L and Menu 2L are the same, except that the symbols on Menu 1L are positioned horizontally and those on Menu 2L are positioned vertically (rotated -90 degrees relative to Menu 1L). The descriptions of the functions given below apply equally to both menus.

3.1.1 SUPPLY

SUPPLY			
3-PHASE HORIZ.	SUPPLY VERTICAL	SUPPLY HORIZ.	

Figure 3-1. Supply

Explanation:	These are not apparatus but ready-made phase lines for motor circuits and regular circuit diagrams (vertical and horizontal). They have references at both ends of the connection lines; this is a requirement for the generation of connection tables.
Type of symbol:	Composite auxiliary symbol

3.1.2 RELAY ACCESSORIES

RELAY ACCESSORIES			
Interf. suppr.	Mechanical interlock	Latching device	Misc. S access.

Figure 3-2. Relay Accessories

INTERFERENCE SUPPRESSION

Explanation:	Clicking on this box gives an icon menu with interference suppression.
Type of symbol:	Apparatus (interference suppression)

MECHANICAL INTERLOCKING

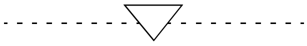


Figure 3-3. Mechanical Interlocking

Type of symbol: Apparatus (mechanical interlocking)

LATCHING DEVICE

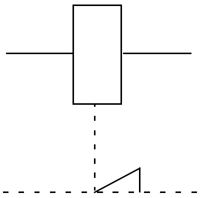


Figure 3-4. Latching Device

Type of symbol: Apparatus (latching device)

MISCELLANEOUS ACCESSORIES

Explanation: An icon menu containing the accessories socket, lock device, contact protection, cover, and arbitrary apparatus.

If arbitrary apparatus is selected, an apparatus is created with all data in the symbol, that is, the user must specify all data for the apparatus.

All apparatuses under this box are invisible. It is advisable to place them on the relevant relay. If the user wants to change the data for any apparatus, the recommended method is to use the “CHANGE apparatus” function on menu 1R.

Type of symbol: Apparatus (socket, lock device, contact protection, and cover)

3.1.3 CONT. RELAY

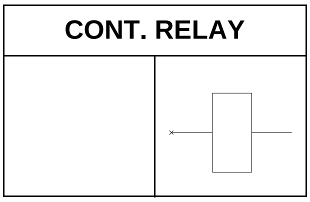


Figure 3-5. Cont. Relay

Type of symbol: Main symbol and coil of a relay contactor

Type of symbol: Apparatus (relay contactor)

3.1.4 CONTACTOR

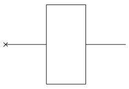
CONTACTOR	
	

Figure 3-6. Contactor

Explanation:	Main symbol and coil of a contactor
Type of symbol:	Apparatus (contactor)

3.1.5 CROSS-REF

CROSSREF.	
CROSS S	INSET S DIAGR.

Figure 3-7. Cross-References

Explanation: Box 1 “CROSS” is not used in this version; it is reserved for future requirements.

“INSET DIAGR.” contains the symbols that can be placed at the “mother symbols”, for example, the coil of a relay, and then be given references to included sub-symbols. They are chosen from an icon menu that is divided into horizontal and vertical contact tree diagrams and basic symbols that can be used to construct contact tree diagrams at will.

3.1.6 RELAY

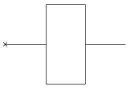
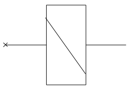
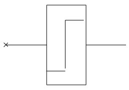
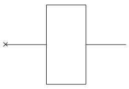
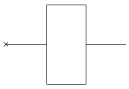
RELAY	
MORE COILS S	
	
LIGHT: 	TIME: 

Figure 3-8. Relay

Explanation: Main symbol and coil of relay. “MORE COILS” contains available coils, for example, the relay types “relay coil with two windings”, “remanence coil with two windings” and “supplementary coil and dropout coil”.

Type of symbol: Apparatus (relay, time relay, and light relay)

3.1.7 IEC SYMBOLS

<table>
<tr><th colspan="3">IEC-SYMBOLS</th></tr>
<tr><td></td><td>MORE
S SYMB.</td><td>QUALIFYING SYMBOLS
S (IEC-617/2)</td></tr>
</table>

Figure 3-9. IEC Symbols

Explanation: The “MORE SYMBOLS” box gives a list of all available symbol groups.

Clicking on the “QUALIFYING SYMBOLS” box puts up a menu of qualifying symbols from Part 2 of IEC 617. These are divided into the following categories (the abbreviated menu text appears in parentheses):

- Kind of current and voltage (Current type)
- Variability ()
- Direction of force or motion (Dir. force/mov)
- Direction of flow (Flowdir/type)
- Relay access functions (Relay access.)
- Operating devices and methods (Contr. contact)
- Control by non-electrical quantities (Contr. non el.)
- Earth (ground) and frame connections (Earth & Frame)
- Miscellaneous (Other symbols)

Type of symbol: Diverse

3.1.8 SPECIAL SYMBOLS

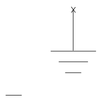
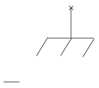
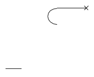
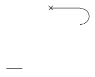
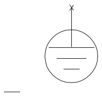
SPECIAL SYMBOLS			
			
	SIGNAL DIRECTION >	ARBITRARY APP.	OPTIONAL APP.

Figure 3-10. Special Symbols

Explanation:	The first five symbols in this group are different kinds of earth (ground): General ground symbol, frame (chassis), insulated conductor or cable and protective ground. All these symbols are “connection-giving”, and generate connection names in tables. The sixth symbol is the signal direction for conductors.
Type of symbol:	IEC
Explanation:	**“ARBITRARY APPARATUS”** and **“OPTIONAL APPARATUS”** are not used in version 12. They will be replaced in later versions.
Type of symbol:	Apparatus (“optional”)

3.1.9 TIMERS

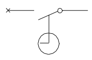
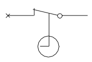
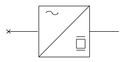
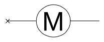
TIMERS			
			

Table 3-1. Timers

Explanation:	Within this area there are different types of timer.
Type of symbol:	Apparatus (timer)

3.1.10 INDICATIONS

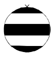
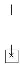
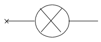
INDICATIONS			
			MORES

Table 3-2. Indications

Explanation:	Indication flag with automatic return; indicates when relay coil is energized. Indication for non-energized coil is on an icon menu. Indication flag with manual reset; indicates when relay coil is energized, and continues to indicate when the supply is removed. There is a blocked flag on an icon menu.
Type of symbol:	Qualifying symbols
Explanation:	Signal lamp which may be part of an apparatus, for example, a lamp push-button. There are more signal lamps on an icon menu.
Type of symbol:	Part of apparatus

3.1.11 POSITION SWITCHES

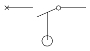
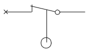
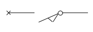
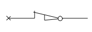
POSITION SWITCHES			
			

Table 3-3. Positions Switches

Explanation:	This area contains various types of position switches.
Type of symbol:	Apparatus (position switch)

3.1.12 CONTACTS

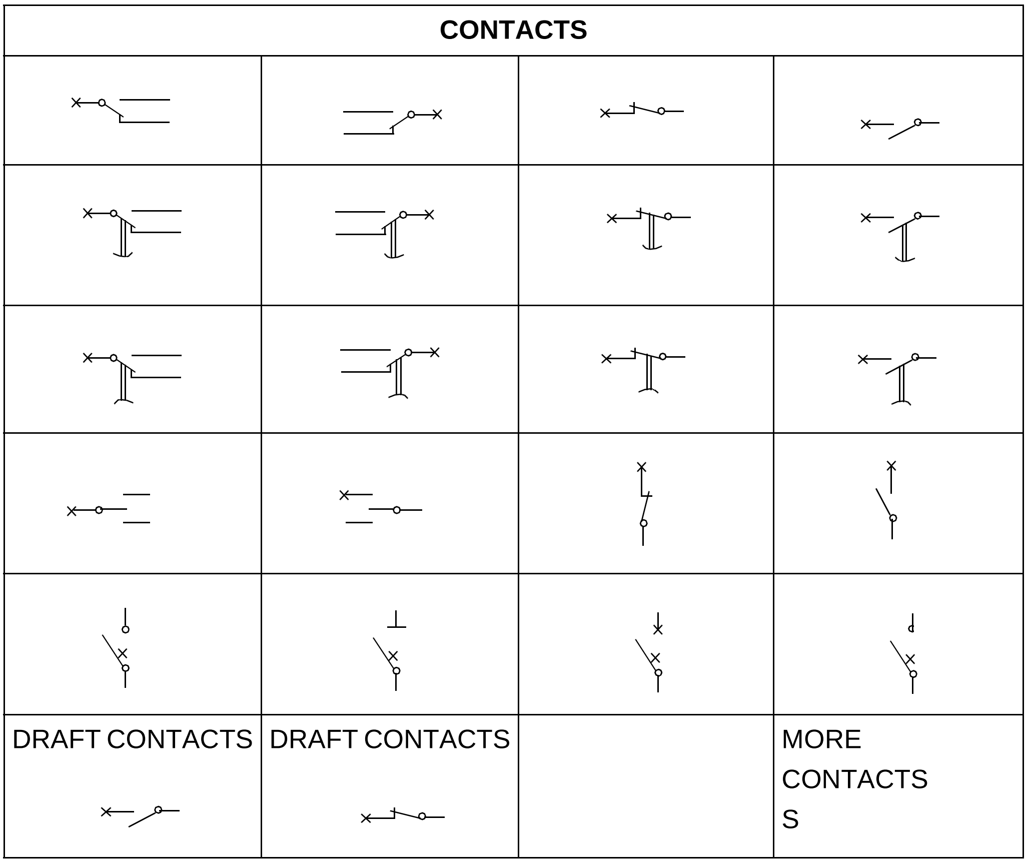


Figure 3-11. Contacts

ROWS 1-5

Explanation:	The first four rows are different types of contacts that are used in relays, contactors, and so on. The circle in these can be removed under configuration, see Section 2.2.3. There are more contacts under the “MORE CONTACTS” box. When these symbols are inserted, a screen menu with ready-made terminal numbers appears in response to the terminal number prompt. The fifth row contains contact functions for main circuits.
Type of symbol:	Part of apparatus (contact)

ROW 6

Explanation:	The sixth row contains decorative contacts; these have no item designation or terminals.
Type of symbol:	Qualifying symbols

3.1.13 MANUALLY OPERATED SWITCHES

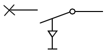
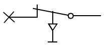
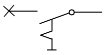
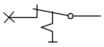
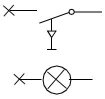
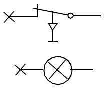
MAN. OP. SWITCHES			
			
			MORE SWITCHES S

Figure 3-12. Manually Operated Switches

Explanation: This area contains various types of switches. The most common types have their own boxes; the rest are under “MORE SWITCHES”.

Type of symbol: Apparatus (push-button and lamp push-button)

3.1.14 SIGNAL LAMPS‘

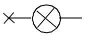
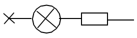
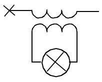
SIGNAL LAMPS			
			MORE S

Figure 3-13. Signal Lamps

Explanation: Various types of signal lamps. From left to right, signal lamp, signal lamp with built-in lamp resistor, and signal lamp with transformer.

Type of symbol: Apparatus (signal lamp)

3.1.15 INSTRUMENTS

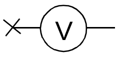
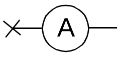
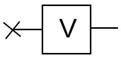
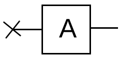
INSTRUMENTS			
			

Figure 3-14. Instruments

Explanation: Voltmeters and ammeters

Type of symbol: Apparatus (voltmeters and ammeters)

3.1.16 FUSES

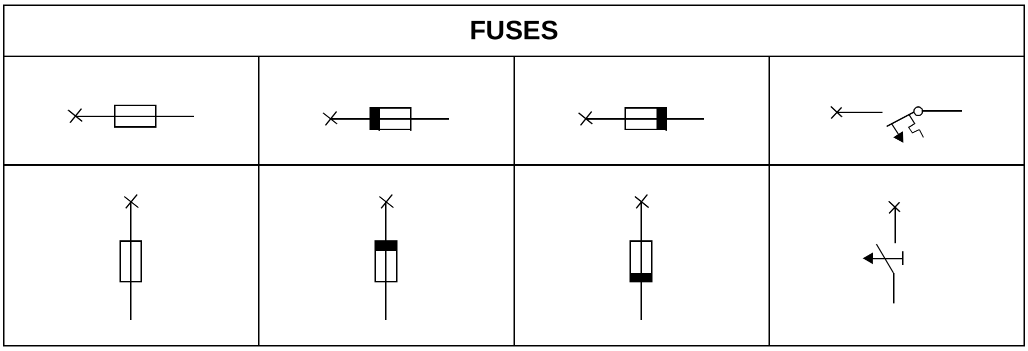


Figure 3-15. Fuses

Explanation:	Various types of fuses. The different types from left to right (top and bottom rows) are: blade fuse, screw-plug fuse, screw-plug fuse and automatic fuse (miniature circuit-breaker, MCB).
Type of symbol:	Apparatus (blade and screw-plug fuses, MCBs)

3.1.17 CONTACT BLOCKS

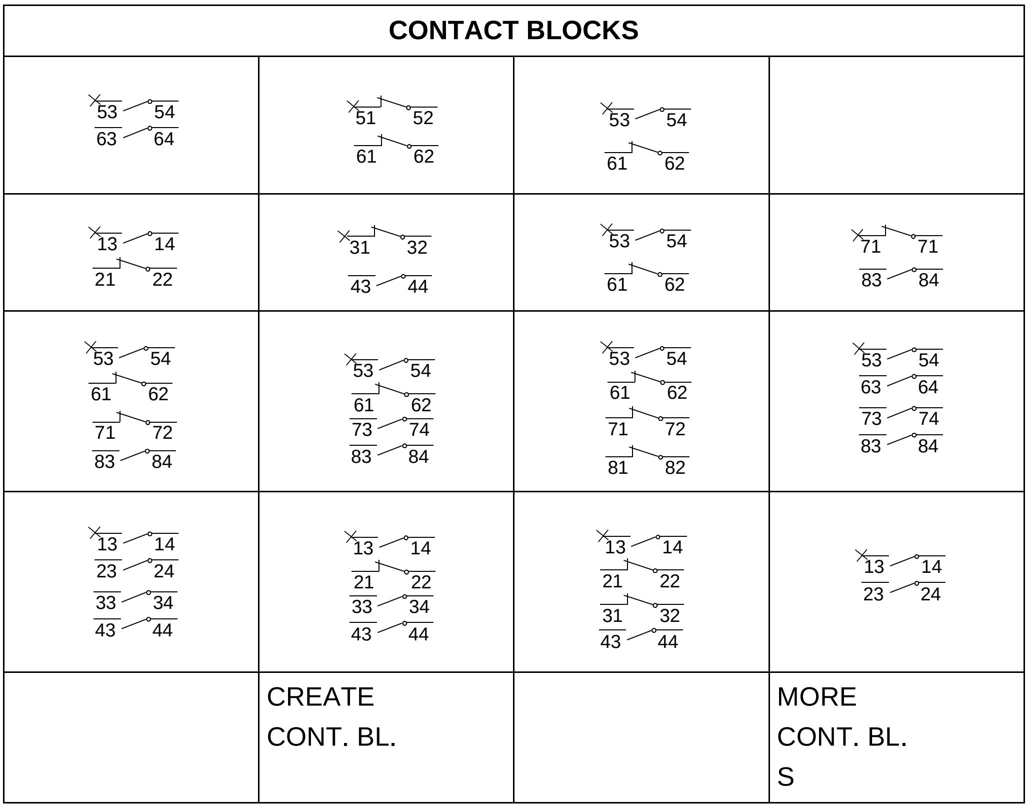


Figure 3-16. Contact Blocks

Explanation:	These symbols are auxiliary contact blocks and thus give an item in the apparatus list, if there is one. They are inserted as individual contacts and can be moved independently; in addition, a special contact block is set, which gives the item in the apparatus list. With “CREATE CONT.BL.” you can insert the apparatus block only if the contacts are inserted individually from the “CONTACTS” area. “ABG10 CONT.BL” is not used in this version.
Type of symbol:	Apparatus (auxiliary contact blocks)

3.1.18 RESISTORS/CAPACITORS

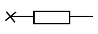
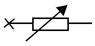
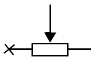
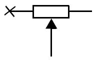
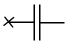
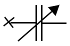
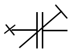
RESISTORS/CAPACITORS			
			
			MORE S

Figure 3-17. Resistors/Capacitors

Resistors (top row)

Explanation:	Resistor, variable resistor, and resistor with slider.
Type of symbol:	Apparatus (resistor)

Capacitors (bottom row)

Explanation:	Capacitor, variable capacitor, and trimmer capacitor.
Type of symbol:	IEC

3.1.19 DIODES

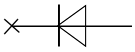
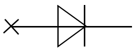
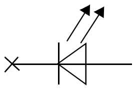
DIODES			
			MORE SEMICOND.

Figure 3-18. Diodes

DIODES

Explanation:	Regular diode and light-emitting diode (LED).
Type of symbol:	Apparatus (diode and LED)

MORE SEMICOND.

Explanation:	More semiconductors to IEC standard.
Type of symbol:	IEC

3.1.20 TRANSDUCERS

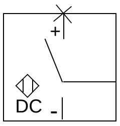
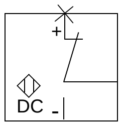
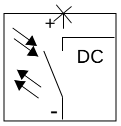
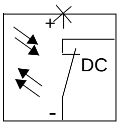
POS. SWITCH (IND. & PHOTO)			
			
		INDUCTIVE DEVICES S	PH OTO DEVICES S

Figure 3-19. Transducers

Explanation: This area contains various types of photocells and inductive transducers.

Type of symbol: Apparatus (transducer and photocell)

3.1.21 I/O SYMBOLS

I/O SYMBOLS			
INPUT MODULE	OUTPUT MODULE	GENERAL SYMBOL	MORE S

Figure 3-20. I/O Symbols

Explanation: The first two boxes are not used in this version; until further notice use the functions under “MORE” below. Users may use them at will, but we reserve the right to use them in a future version.

“GENERAL SYMBOL” contains a general symbol for input or output, where the user must give the type of I/O and number.

“MORE” leads to an icon menu where you can choose DI, DO, AI, or AO.

Type of symbol: Part of apparatus

3.1.22 PILOT SWITCHES

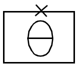
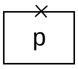
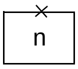
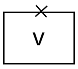
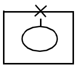
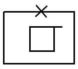
PILOT SWITCHES			
			
			MORE S

Figure 3-21. Pilot Switches

Explanation: This area contains various types of pilot switches. Those on the menu itself are, from left to right, temperature switch, pressure switch, speed detector, voltage detector, and (on row two) level detector and flow detector.

Note: On menu 2L the diagrams have been rotated 90 degrees in error. The pilot switches should be oriented as above in both the horizontal and the vertical diagram. If a different orientation is required, the icon menu under “MORE” provides a function for this purpose.

Type of symbol: Apparatus (pilot switch)

3.2 Menu 3L

For the fuses below, if you click on the bottom half of the box you will automatically get the terminal numbering shown in the menu diagrams. Clicking on the upper half of a box results in prompts about terminal numbering.

In all other squares, the terminal numbering and item designations are given through a dialog box.

3.2.1 MISCELLANEOUS

MISCELLANEOUS			
3-PH ASE SUPPLY	WIND- INGS	MORE TRANSD.	MORE 617-6

Figure 3-22. Miscellaneous

Explanation: “3-PHASE SUPPLY” gives phase lines with supply references at both ends.

“WINDINGS” are qualifying symbols of windings to IEC 617-6.

“MORE CONVS.” Not used in this version.

“MORE 617-6” gives more pure IEC symbols.

Type of symbol: Qualifying symbols

3.2.2 TRANDUCERS

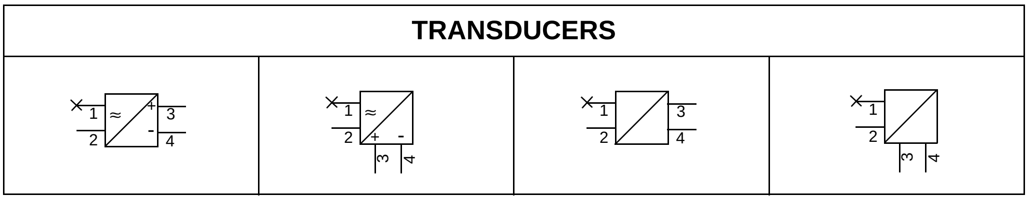


Figure 3-23. Transducers

Explanation: Symbols for converters.

Type of symbol: Apparatus (converter)

3.2.3 CONNECTION SETS

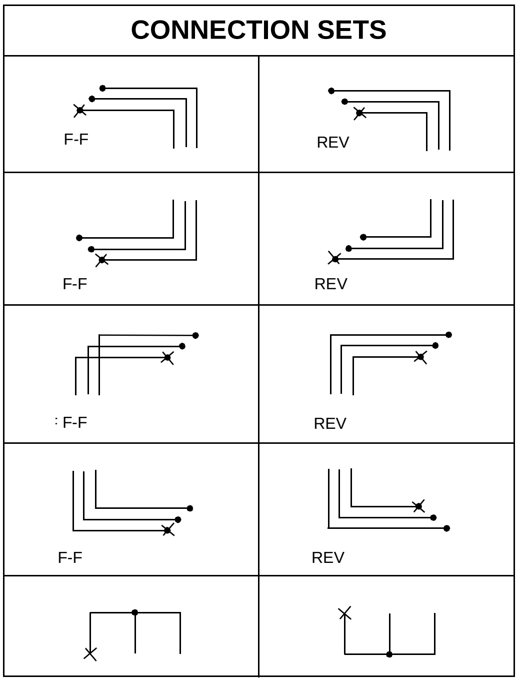


Figure 3-24. Connection Sets

Explanation: Ready-made interconnections can be inserted from this area. When an interconnection is inserted, you are prompted to specify whether it is to be short or long.

Type of symbol: Apparatus

3.2.4 CURR TRANSF

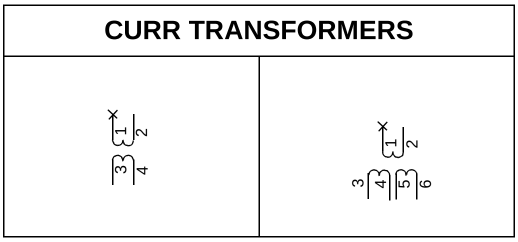


Figure 3-25. Current Transformers

Explanation: In this area there are two different current transformers.

Type of symbol: Apparatus (current transformer)

3.2.5 VOLT TRANSF

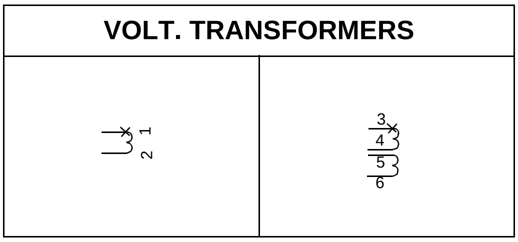


Figure 3-26. Voltage Transformers

Explanation: In this area there are two different voltage transformers.

Type of symbol: Apparatus (voltage transformer)

3.2.6 TRANSFORMERS

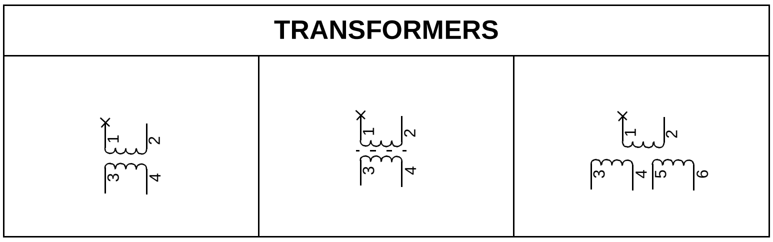


Figure 3-27. Transformers

Explanation: From left to right, transformer with two windings, transformer with two windings and screen, transformer with three windings.

Type of symbol: Apparatus (transformer)

3.2.7 SWITCHES AND PROTECTION APPARATUS

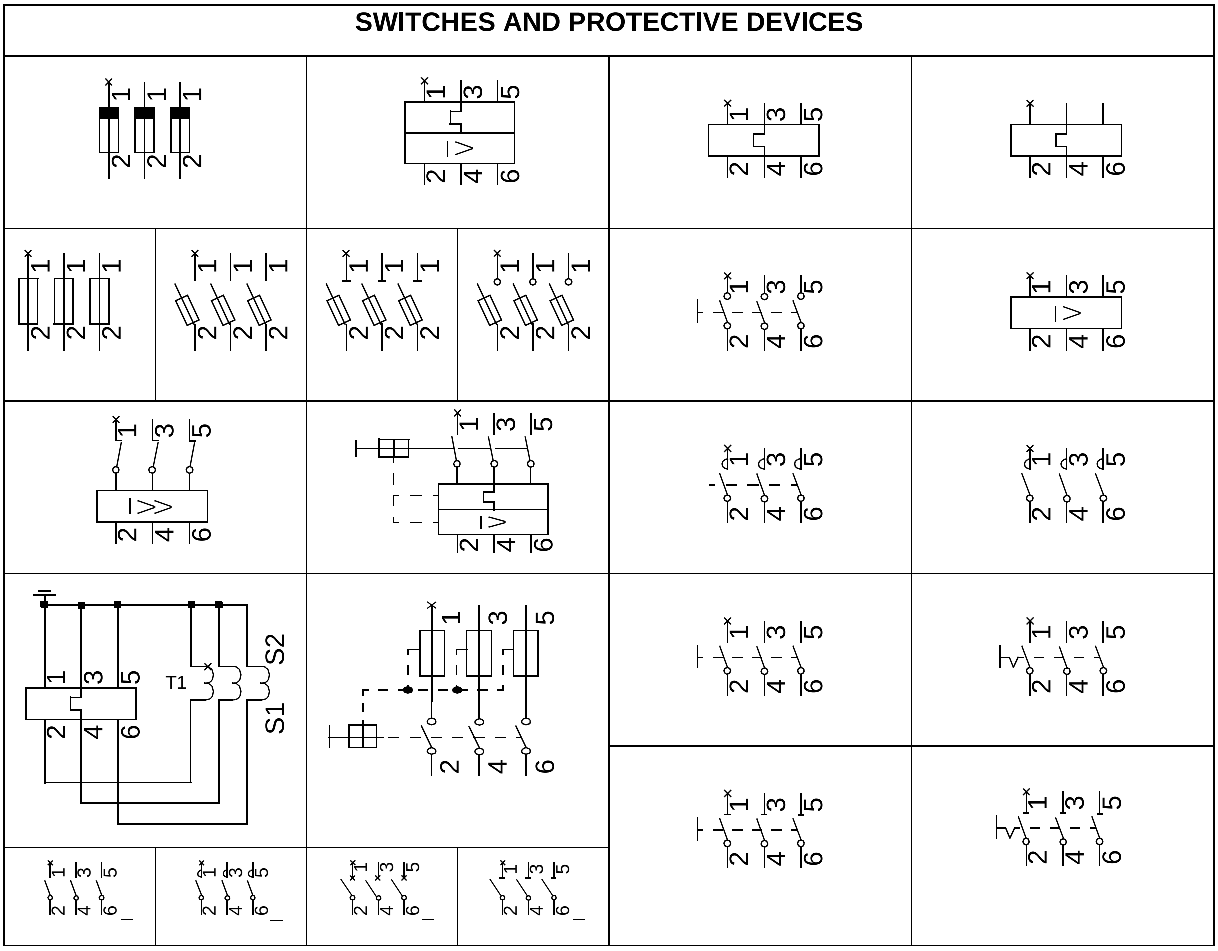


Figure 3-28. Switches and Protective Devices

Explanation:	This area contains various types of symbols, most of which fall into the category of apparatus. Exceptions are boxes with a minus sign in the bottom right-hand corner, which are normal IEC symbols, and the box at the far right of row three, which contains parts of apparatus.
	The description of symbol types below applies to each row, from left to right.

ROW 1:

Type of symbol:	Apparatus (screw-plug fuse)
	Apparatus (direct-on-line starter)
	Apparatus (overload relay)
	Apparatus (overload relay)

ROW 2:

Type of symbol: Apparatus (blade fuse)
Apparatus (MCB)
Apparatus (MCB)
Apparatus (MCB)
Apparatus (load isolator)
Apparatus (overcurrent protection)

ROW 3:

Type of symbol: Apparatus (current limiter)
Apparatus (direct-on-line starter)
Apparatus (direct-on-line starter)
Part of apparatus (contact block)

ROW 4:

Type of symbol: Apparatus (relay transformer)
Apparatus (load isolator with fuse)
Apparatus (fuse-switch)
Apparatus (fuse-switch)

ROW 5:

Type of symbol: IEC
IEC
IEC
IEC
Apparatus (isolator)
Apparatus (isolator)

3.2.8 MOTORS

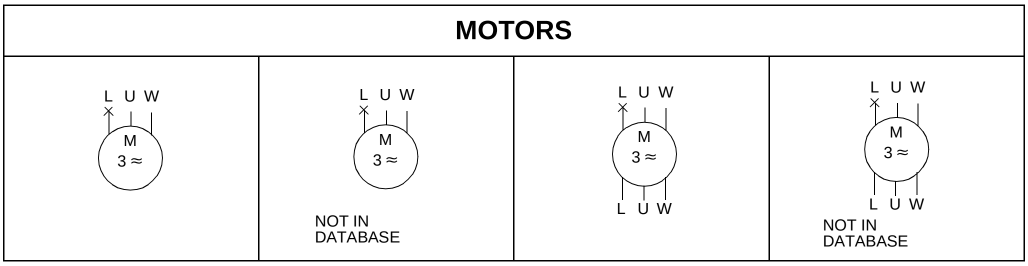


Figure 3-29. Motors

Explanation:	This area contains two different three-phase induction motors. Each of the two motors can be inserted into the drawing in two ways, either as apparatus with data stored in the apparatus database, or as apparatus with data stored in the symbol. Apparatus with data stored in the symbol has the words “NOT IN DATABASE.” in its box.
Type of symbol:	Apparatus (motor)

Chapter 4 Symbol Creation Menu

This menu is designed for users who wish to create their own symbols. The purpose of the menu is to make it easy to create symbols that can be used in conjunction with the functions offered by the Electrical Diagram Builder Circuit. Symbols sometimes have to be “connection-giving” so that they are included in connection tables, and they have to contain special information to be included in apparatus lists. They should be similar regarding what information (for example, item designation and terminal) is in the symbol, and they should, as far as possible, follow standards. The Electrical Diagram Builder Circuit helps with these things when you use the symbol creation menu.

The symbol creation menu also makes it easy to edit existing symbols or to create new symbols based on existing ones. In addition, a symbol created with the symbol creation menu will be compatible with the Electrical Diagram Builder Circuit’s own symbols as far as texts, layers, and so on, are concerned.

Chapter 4 ends with a section on the recommended procedure when creating a symbol, which also describes in more detail how to create a symbol in practice.

4.1 Functions on the symbol creation menu

The symbol creation menu is divided into function areas as shown in the illustration below.

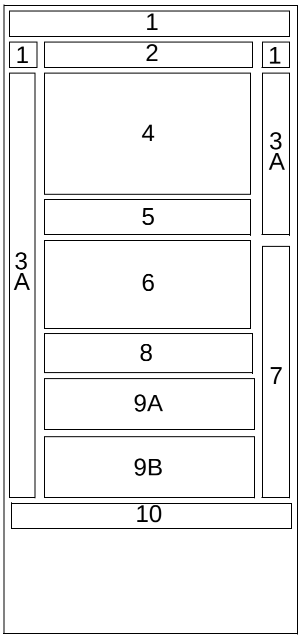


Figure 4-1. Areas in the Symbol Creation Menu

Every part of the menu will be dealt with in detail in the sections that follow.

4.1.1 Initializing area. Area 1

Function: So that AutoCAD knows which menu is currently on the digitizer, you must perform an initialization command. The functions in this area are used for this. When you initialize the symbol generation menu, the necessary commands are loaded into AutoCAD, and certain layers that are normally hidden (switched off) are shown (switched on).

The procedure for returning after symbol creation is described below.

Procedure: Click on the “2R” box.

Then click on the “INIT Menu 2R” box.

Create symbols.

Return to menu “1R” by first clicking on the “Reset” box.

Remove menu 2R, put back menu 1R, and click on the “1R” box.

4.1.2 Insertion of blocks. Area 2

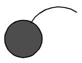
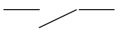
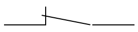
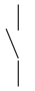
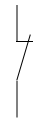
INSERTION OF BLOCK					
INSERT	Explode 				

Figure 4-2. Insertion of Block

Existing symbols are often used as a basis for creating new ones, since it is simpler to do this. This part of the menu makes it easier to retrieve existing blocks.

INSERT

Function: This function starts the AutoCAD Insert command.

Procedure: Click on the “INSERT” box.

Specify the desired block.

Point to the required insertion point.

Explode

Function: This function starts the AutoCAD Explode command. Explode divides a block up into its component parts, allowing you to delete and add parts at will.

Contact blocks

Function: These four contacts are useful when you need to draw a symbol that includes a contact. They allow you to switch between a contact with a ring in the symbol and a contact with no ring, without having to redefine your symbol. There are equivalent blocks for two-way and changeover contacts, but there was no room for them on the menu. Their numbers are 70204 and 70205 respectively, and they can be inserted with “Insert” above.

Procedure: Click on the contact required.

Position the contact.

4.1.3 Layers. Areas 3a and 3b

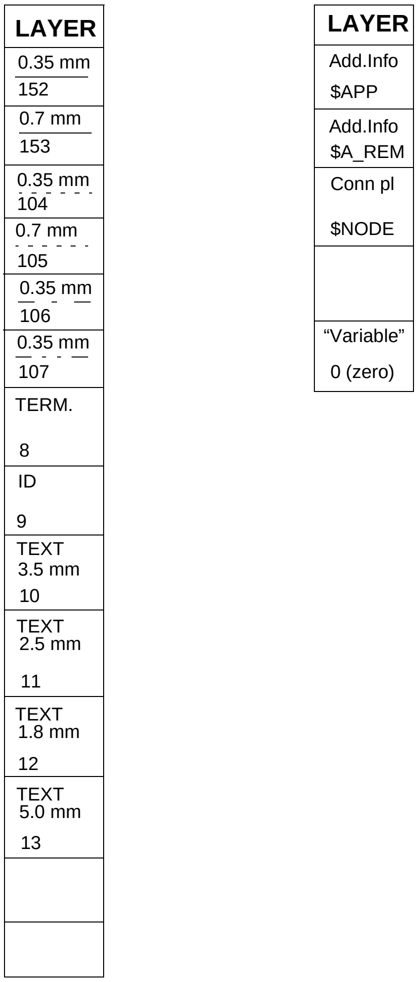


Figure 4-3. Layers - Areas 3a and 3b

Function: A symbol in the Electrical Diagram Builder Circuit is made up of several parts. These parts are often placed on different layers (for more information see Section 2.9.5 Layer system). Use this area for easy switching between layers when creating your symbol.

Procedure: Click on the box for the layer required.

Create the parts of the symbol that are to be on this layer.

4.1.4 Apparatus information. Area 4

<Not used in version 12. Will be replaced in later version of the Electrical Diagram Builder Circuit>

4.1.5 Cross-references. Area 5

<Not used in version 12. Will be replaced in later version of the Electrical Diagram Builder Circuit>

4.1.6 Terminal definition. Area 6

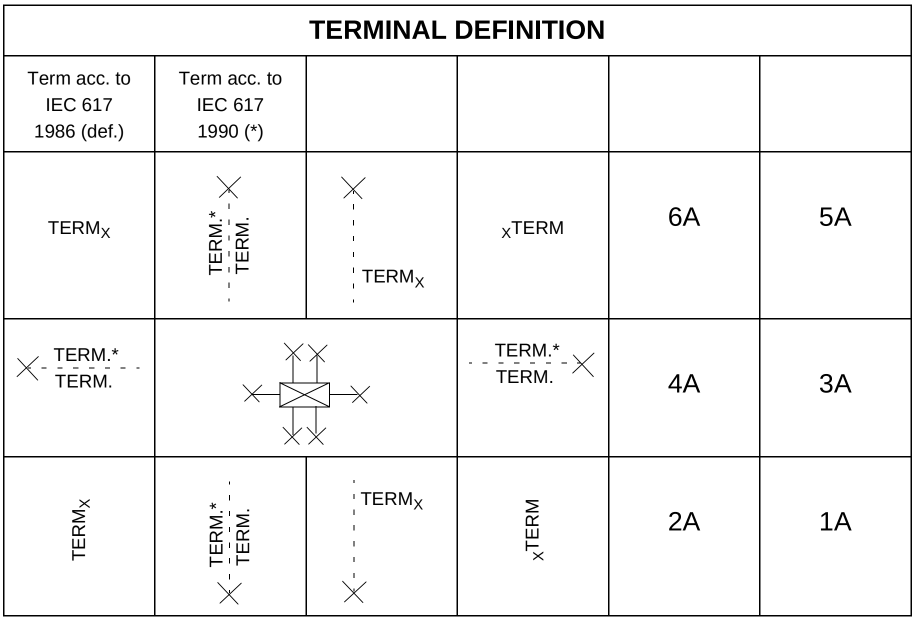


Figure 4-4. Terminal Definition - Area 6

For each symbol that contains connections, a “node” and an attribute must be placed at the end of each connection. The node and the attribute are placed automatically when you use the functions in this area.

The “node” consists of a block. If nodes are placed at all connection points, the Electrical Diagram Builder Circuit EPS can identify that they are electrical connection points. This means that it is the nodes that make a symbol “connection-giving”.

The terminal designation is then stored in the attribute at each connection.

Function: The two boxes at the top left of the area are used to specify the IEC standard that is to be used for the placing of the symbols. The options are the standard of 1986 (the default) or the standard that was finalized during 1990. You can see from the menu boxes how the two standards differ regarding the placing of the terminal designations.

There are ten boxes that are used to place terminals. The information in the boxes shows which box to click on for your required placing.

The six boxes at the right of the area contain the names that should be used for the terminal attributes. If there are more than six terminals, attribute names must be entered manually. Recommended names are 7A, 8A, and so on.

The difference between an attribute and a node is that an attribute has a numeral first, followed by a letter; for a node it is the other way around.

Procedure: Specify which standard you want to use. (If you want to use the 1986 standard, omit this step, since the 1986 standard is the default.)

Place the terminals on your symbol in order. This is done by clicking on whichever of the terminal boxes corresponds to the relevant terminal in your symbol.

When you have clicked on a terminal box, the system asks for a tag (name) for the terminal attribute. You can take this tag from one of the six boxes on the right.

4.1.7 Misc. Area 7

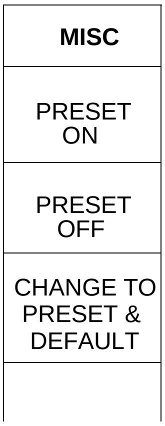


Figure 4-5. Misc. Area 7

Function: The functions in this area are meant to be used when you define your terminal. You can make the terminal attribute “PRESET”, meaning that the system will not put up prompts about this attribute when you insert your symbol in the drawing. Instead, the value of the attribute will be the value given when you created the symbol. To change an attribute in an already inserted symbol that is defined as “PRESET”, use the “EDIT VALUE” function on menu 1R.

There are two ways to make a terminal attribute “PRESET”. The first is to click on “PRESET ON” before defining your terminals. The other is to use the “CHANGE TO PRESET & DEFAULT” function. This function may also be used for the opposite purpose, that is to remove “PRESET” from an attribute. The latter method is recommended, since it is easy to forget to do “PRESET OFF” when you have finished with your terminal.

Note: The Electrical Diagram Builder Circuit does not use “PRESET” in its own insert function; however, “insert” is often used with user-defined symbols.

Procedure:	This is the recommended procedure:
	Insert a terminal designation in your symbol.
	Click on the “CHANGE TO PRESET & DEFAULT” box.
	Specify that you want to make an attribute “PRESET”.
	Specify the default value for the terminal attribute.
	Point to the attribute that is to be made “PRESET”.
	Repeat the procedure until all terminals are complete.

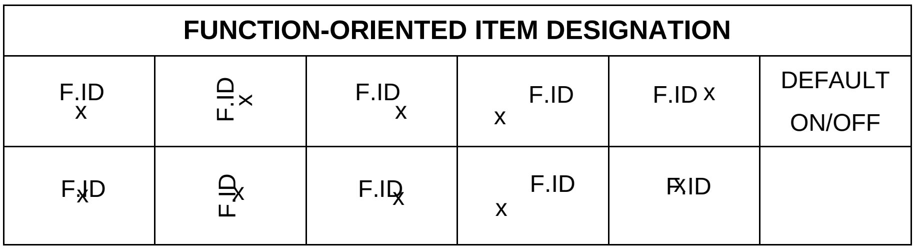
4.1.8 Miscellaneous attributes. Area 8

MISC. ATTRIBUTES					
NORMAL	PRESET	CONSTANT	INVISIBLE	CONSTANT INVISIBLE	ATT DEF.

Figure 4-6. Miscellaneous Attributes - Area 8

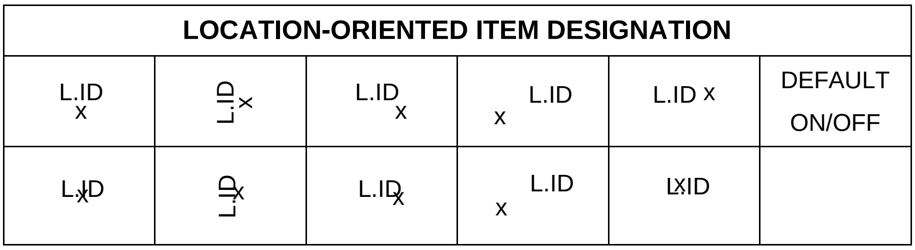
Function:	This area contains functions that allow you to insert your own attributes (attributes that are not on the symbol creation menu) in a symbol. All functions in this area start the AutoCAD ATTDEF command. The differences between the functions have to do with the positions where the attributes are defined. For more information, read about the ATTDEF command in the AutoCAD manual.
Procedure:	Click on the box that gives the required attribute type.
	Respond to the prompts that follow (see the AutoCAD manual).
	Place the attribute in the symbol.

4.1.9 Item designations. Areas 9a and 9b



FUNCTION-ORIENTED ITEM DESIGNATION					
F.ID x	F.ID x	F.ID x	F.ID x	F.ID x	DEFAULT ON/OFF
F.ID x	F.ID x	F.ID x	F.ID x	F.ID x	

Figure 4-7. Function-Oriented Item Designation



LOCATION-ORIENTED ITEM DESIGNATION					
L.ID x	L.ID x	L.ID x	L.ID x	L.ID x	DEFAULT ON/OFF
L.ID x	L.ID x	L.ID x	L.ID x	L.ID x	

Figure 4-8. Location-Oriented Item Designation

There are two types of item designations in the Electrical Diagram Builder Circuit: location-oriented and function-oriented item designations. Where only one item designation is used in the symbol—the normal case—the location-oriented item designation is used.

On the application menu there are two areas for item designation definition. One is headed “FUNCTION-ORIENTED ITEM DESIGNATION”, the other “LOCATION-ORIENTED ITEM DESIGNATION”. Each of these areas has ten boxes for placing the item designation, and a box that is used to toggle on/off the prompt about default value for item designations.

Item designations

Function: These boxes are used to place item designations in symbols. There are ten possible ways of placing an item designation. These run from left to right, starting at the top left. All the descriptions below are relative to the insertion point:

1. Horizontal, centered, 1 mm above.
2. Vertical, centered, 1 mm to the left.
3. Horizontal, ranged right, 1 mm above.
4. Horizontal, ranged left, 1 mm above and 1 mm to the right.
5. Horizontal, ranged right, vertically centered.
6. Horizontal, centered.
7. Vertical, centered.
8. Horizontal, ranged right.
9. Horizontal, ranged left, 1 mm to the right.
10. Horizontal, centered both horizontally and vertically.

Procedure: Click on the required box.

Place the item designation in the symbol.

DEFAULT ON/OFF

Function: You can use this box to choose whether or not you want the Electrical Diagram Builder Circuit to prompt for the default value on insertion of the item designation. This is a toggle function; that is, it alternates between on and off. Initially it is on.

Procedure: Click on the “DEFAULT ON/OFF” box.

4.1.10 Block definition. Area 10

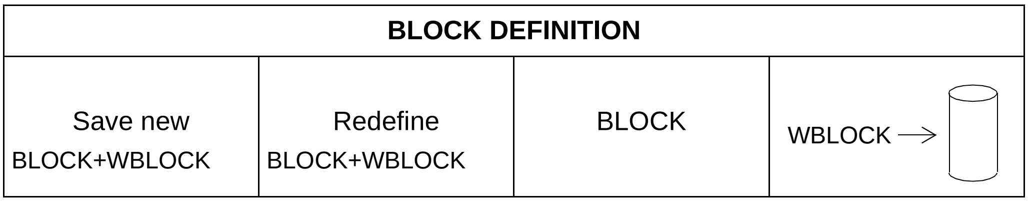


Figure 4-9. Block Definition - Area 10

This area contains functions to be used when you have finished your symbol and you want to make a block from it.

Save new BLOCK+WBLOCK

Function: This function saves a symbol both in the current drawing and on the desired library on the hard disk.

Procedure: Click on the “Save new BLOCK+WBLOCK” box.

Specify desired block name.

Mark the desired insertion point for the symbol.

Mark the component part of the symbol. (The easiest way to do this is to use the AutoCAD window function.)

Redefine BLOCK+WBLOCK

Function: This function is used to replace an existing symbol, both in the current drawing and on the desired library on the hard disk.
Note: Remember to try out the symbol before replacing the existing one.

Procedure: Click on the “Redefine BLOCK+WBLOCK” box. BLOCK+WBLOCK”.

Specify the desired block name.

Mark the desired insertion point for the symbol.

Mark the component part of the symbol. (The easiest way to do this is to use the AutoCAD window function.)

BLOCK

Function: This command is identical to the AutoCAD BLOCK command.

Procedure: See the AutoCAD manual.

WBLOCK

Function: This command is identical to the AutoCAD BLOCK command.

Procedure: See the AutoCAD manual.

4.2 Recommended procedure

It is important to adopt a systematic approach when you create a symbol. The recommended procedure is first to complete the graphical parts of the symbol, then to add the required attributes and terminals. For the graphical part of the symbol it is important to use the right layers, since the graphical part must be decorative only.

As for attributes, the order in which the prompts about the order of the attributes are displayed is determined at this stage. The order of the prompts should be the same for all the symbols used. The list below shows the order in which the prompts are displayed for the symbols in the Electrical Diagram Builder Circuit:

- Location-oriented item designation
- Function-oriented item designation
- Terminal 1A
- Terminal 2A
- ....
- Terminal nA

Some symbols do not contain all the attributes in the list. For these symbols, the attribute prompts are displayed after the relative placing of the attributes in the list.

There are two ways of creating a symbol so that the attribute prompts are displayed in the order above:

Method 1

Procedure: Complete the graphical part of your symbol.

Then place the desired attributes in the symbol. This is done in the opposite order of the list (the idea being that you should work from the top down in the menu).

Start the function from the “BLOCK DEFINITION” area.

Specify a symbol name.

Press Return to indicate that the symbol is complete.

Method 2

Procedure: Complete the graphical part of your symbol.

Then place the desired attributes in the symbol. You may do this in any order.

Start the function from the “BLOCK DEFINITION” area.

Specify a symbol name.

Now mark the attributes, one by one in the order in which you want the prompts to appear (according to the list above). Then mark the remaining parts of the symbol.

Press Return to indicate that the symbol is complete.

4.2.1 Example: Create symbol

To make it easier for you to understand how to create a symbol, this section provides a practical example. This is the symbol we have chosen to create.

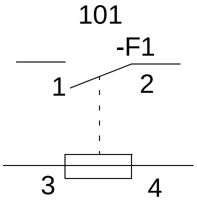


Figure 4-10. Example - Create Symbol

The symbol we have chosen is a fuse with a separate alarm circuit. The IEC number of the symbol is 072105.

We shall go through the creation of this symbol step by step. The procedure is as described under Method 1 in the section headed Recommended procedure.

4.2.1.1 Step 1, initialize

Before the symbol creation menu can be used it must be initialized. This is done by first clicking on the “2R” box, then on the “INIT Menu 2R” box. When this has been done, AutoCAD knows that the symbol creation menu is on the digitizer.

4.2.1.2 Step 2, create graphical symbol

The time has now come to create the graphical symbol. There are two possible ways of doing this: an existing graphical image can be inserted on the drawing and then altered as required; or a graphical image can be drawn manually with AutoCAD.

In this example you will create a symbol. The first step is to fetch the contact from the “Insertion of blocks” area. This is the procedure:

1. Click on the box with the make contact under INSERTION OF BLOCK.
2. Point to the insertion point.
3. Press Enter when prompted for the scale factor and angle.

The symbol now looks like this:

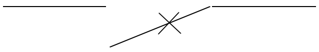


Figure 4-11. Example - Create Graphic Symbol

The cross on the contact indicates a point that is used to attach a mechanical link. Normally points cannot be seen, but they can be made visible to make the creation of a symbol easier.

You could now draw the fuse manually, but it would be more of an exercise to fetch a fuse from the symbol menu (1L or 2L).

1. Click on the box (marked with a double line square in Figure 4-12).

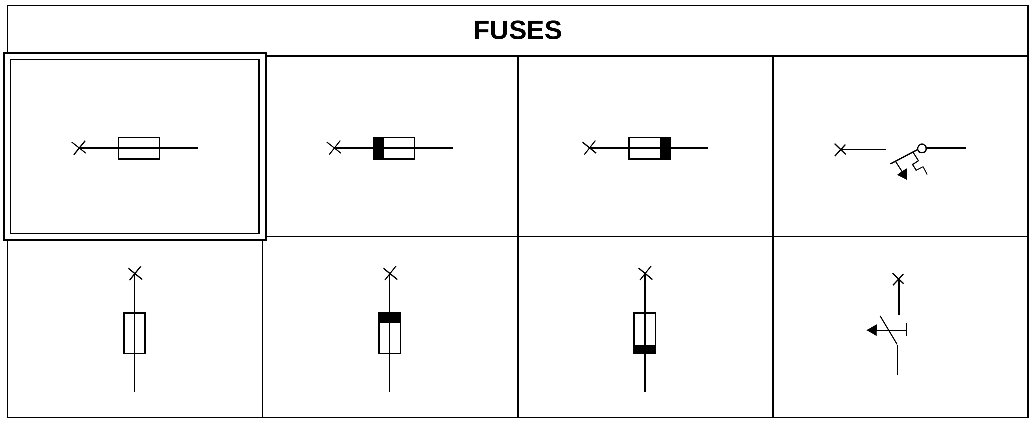


Figure 4-12. Example - Fuses

2. Point to the insertion point.
3. Move past the attribute prompts.
4. Change back to the symbol menu.
5. Select the Explode function by clicking on the box.
6. Explode the fuse symbol by pointing to it and clicking on it.

You should now have a graphical image that looks like this:

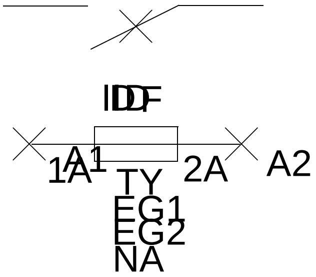


Figure 4-13. Example - Graphical Image

To make sure that the order of the attributes is correct, the old ones must be removed. Use the AutoCAD ERASE command for this.

All that remains to be done in the graphical part of the symbol is to draw the mechanical link. Select the line type “dashed” 0.35 mm from the “Linetype/Layer” area. Draw the link with the

AutoCAD LINE command and OSNAP node. The graphical part of the symbol is now complete. The symbol looks like this:

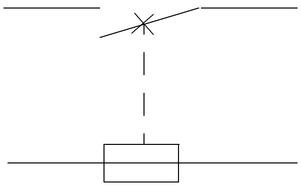


Figure 4-14. Example - Symbol Look

4.2.1.3 Step 3, terminal definition

The next step is to place terminals in the symbol. The order in which the prompts for terminal designations are to appear must now be decided. It will be the opposite of the order in which the terminals are defined; in other words, if the desired order of the terminal designation prompts is as shown in the diagram below, terminal 4 must be defined first and terminal 1 last.

The procedure for the example is:

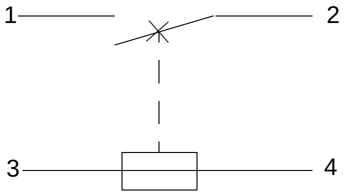
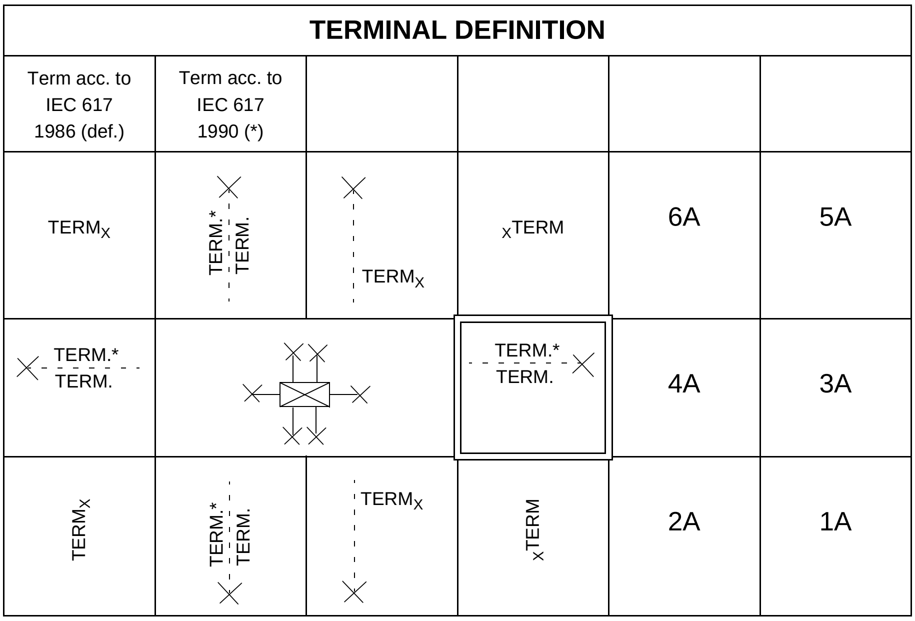


Figure 4-15. Example - Symbol Look

1. Click on the box (marked with a double line square in Figure 4-16).



TERMINAL DEFINITION					
Term acc. to IEC 617 1986 (def.)	Term acc. to IEC 617 1990 (*)				
TERM$_X$	TERM.* TERM.	TERM$_X$	$_X$TERM	6A	5A
TERM.* TERM.			TERM.* TERM.	4A	3A
TERM$_X$	TERM.* TERM.	TERM$_X$	$_X$TERM	2A	1A

Figure 4-16. Example - Terminal Definition - Area 6

2. Specify a tag by clicking on box “4A”.

3. Specify a default value for the symbol, if required.

4. Point to the insertion point.

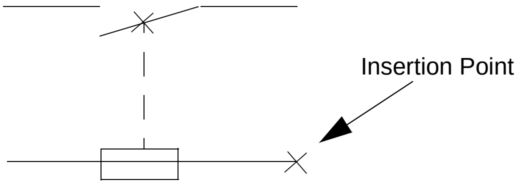


Figure 4-17. Insertion Point - Symbol Look

5. Repeat the procedure in turn for terminal 3, terminal 2, and terminal 1. Be sure to select the correct terminal box and tag (3A, 2A, and 1A).

All terminals have now been defined, and the symbol looks like this:

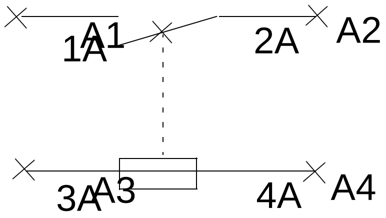
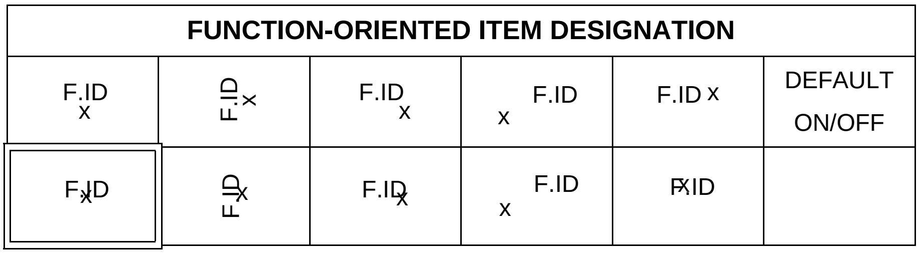


Figure 4-18. Example - Symbol Look

4.2.1.4 Step 4, defining item designations

The only attributes still to be added are item designations. In this example, both location-oriented and function-oriented item designations will be added to the symbol. To make sure that the attribute prompts appear in the right order for the finished symbol, the function-oriented item designation is placed first. This is the command sequence:

1. Click on the box (marked with a double square in Figure 4-19).



FUNCTION-ORIENTED ITEM DESIGNATION					
F.ID x	F.ID x	F.ID x	F.ID x	F.ID x	DEFAULT ON/OFF
F.ID x	F.ID x	F.ID x	F.ID x	F.ID x	

Figure 4-19. Example - Function-Oriented Item Designation

2. Specify a default value if required.

3. Point to the insertion point.

4. Repeat the procedure for the location-oriented item designation. The symbol now looks like this:

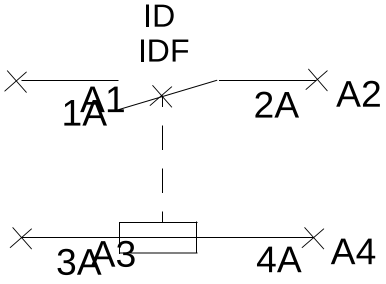


Figure 4-20. Example - Symbol Look

4.2.1.5 Step 5, making a block of the symbol

All that remains is to make a block of the symbol and save it to the hard disk.

For the purpose of this example, use the name “KF72105H” for the symbol. This name conforms to the practice used for the Electrical Diagram Builder Circuit’s own apparatus symbols.

The procedure for making a block of the symbol is:

1. Click on the box (marked with a double square in Figure 4-21).

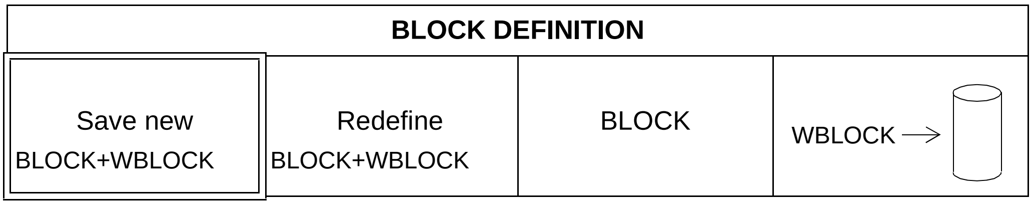


Figure 4-21. Example - Block Definition - Area 10

2. Enter block name; in this case “KF72105H”.
3. Specify the directory where the symbol is to be stored.
4. Mark all the parts of the symbol with the AutoCAD WINDOW command.
5. Confirm by pressing ENTER.

Note that Step 5 would have been done in a different way if the symbol had been created using Method 2 under “Recommended procedure”.

4.2.1.6 Step 6, Reset

When there are no more symbols to be created, perform the “Reset” command. Then replace menu 1R, click on the “1R” box, and resume drawing circuit diagrams.

Chapter 5 Electrical Diagram Builder, Layout

5.1 Concepts and Definitions

Arrangement drawing, layout design

Assembly drawing for one or more enclosures in which the placement and positioning of devices is shown.

Arrangement drawing, hole punch design

A variation of layout design which, rather than showing the devices, uses hole punches and illustrations of the mounting area to illustrate where devices should be mounted.

Enclosure

The physical unit in which devices are placed, that is, fuse box, cubicle, routing area, and so on. Contains a number of mounting planes and, possibly, support items such as plates, sockets, locks, and so on.

Mounting plane

Surface on which devices are mounted. An enclosure may contain one or more mounting planes. Mounting planes may include one or more device groups (see below).

Device group

A set of devices mounted on separate plates or within a separate framework. Examples include motor starters in a low voltage switchgear, or relay protections mounted on a framework.

Device

Articles placed in an enclosure. Each device is represented as a function/item in the circuit diagram. Contactors, push buttons, fuses, and so on, are all examples of devices.

Accessory

Item that is needed for a device to be properly mounted and correctly operating. Examples include cable channels (conduits), relay sockets, mounting bars (DIN bars), and frameworks.

Module

Enclosures with certain height and width spacing requirements.
Example: “S-modules” that are 44.45 mm in height.

Mounting Area

For mounting plates in an enclosure, mounting area refers to the location where, for practical reasons, devices can be mounted (the crease of a metal plate, for example, would affect its mounting area). For devices, mounting area refers to the area needed to mount the device (for example, it is not possible to mount certain push-buttons close to each other).

Hole pattern reference

Attribute to device symbol, the value of which identifies the hole punching pattern for the device.

5.2 Layout of the user interface

This section describes the appearance and functionality of the user interface in the Electrical Diagram Builder Layout. The user interface is based on the pulldown menus. All functions in the system can be executed from the pulldown menus. For the sake of convenience, the digitizer point menu and the screen menus also contain basic drawing and editing commands.

5.2.1 The Pulldown menus

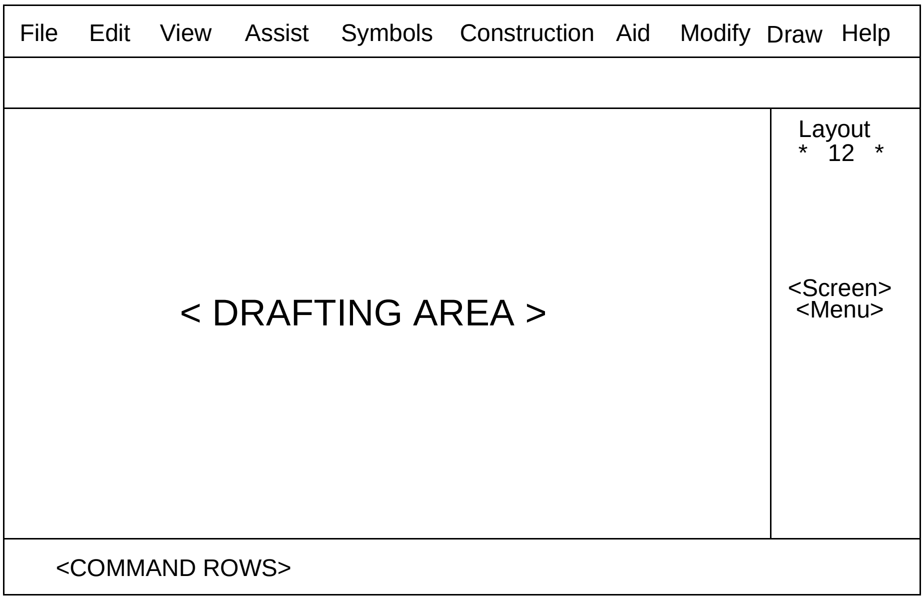

File Edit View Assist Symbols Construction Aid Modify Draw Help
Layout
* 12 *
< DRAFTING AREA >
<Screen>
<Menu>
<COMMAND ROWS>

Figure 5-1. Pull-Down Menus

The pulldown menus contain a combination of AutoCAD commands and general Diagram Builder functions, as well as functions unique to the Electrical Diagram Builder Layout.
The following lists all of the functions found on the pulldown menus, together with references to their descriptions.

Table 5-1. Pull-Down Menus

Title	Function	Description
File	New...	AutoCAD
	Open...	AutoCAD
	Save	AutoCAD
	Save as	AutoCAD
	Recover	AutoCAD
	Quit	AutoCAD
	DIBPLOT	Diagram Builder
	Plot...	AutoCAD
	Global changes	Diagram Builder
	About Layout	Section 5.4.1, About Layout
	End Layout	Section 5.4.2, End Layout
View	Zoom	AutoCAD
	Pan	AutoCAD
	Redraw	AutoCAD
	Redrawall	AutoCAD
	Regen	AutoCAD
	Regenall	AutoCAD
	Layer...	Section 5.5.1, On/Off Layer
	Hide	AutoCAD
Assist	Help!	AutoCAD
	Cancel	AutoCAD
	Undo	AutoCAD
	Redo	AutoCAD
	Object filters...	AutoCAD
	Object snap	AutoCAD
	Inquiry	AutoCAD
	Calculator	AutoCAD
Symbols	Free symbol	Section 5.6.1, Free Symbol
	Enclosure, Mounting plate, etc.	Section 5.6.2, Inserting symbols from the symbol library
	More	Diagram Builder

Table 5-1. Pull-Down Menus (Continued)

Title	Function	Description
Constr. Aid	Select Lgroupp...	Diagram Builder
	Select Layer	Diagram Builder
	Copy One	Section 5.7.2, Copy One
	Copy Row	Section 5.7.3, Copy Row
	Ins. hole pattern	Section 5.7.4, Insertion of hole patterns
	Length bar	Section 5.7.5, Length Bars
	Level...	Section 5.7.6, Level
Modify	DDMODIFY...	AutoCAD
	Lgroupp...	Diagram Builder
	Layer...	Diagram Builder
	Erase	AutoCAD
	Move	AutoCAD
	Copy	AutoCAD
	Stretch	AutoCAD
	Extend	AutoCAD
	Trim	AutoCAD
	Rotate	AutoCAD
	Scale	AutoCAD
	Change	AutoCAD
	Edit attribute. Value	Section 5.8.1, Edit attribute. Value.
	Edit attribute. Position	Section 5.8.2, Edit Attribute. Position.
	Edit attribute. Angle 0-pos	Section 5.8.3, Edit Attribute. Angle 0+position.
	Edit attribute. Angle	Section 5.8.4, Edit Attribute. Angle.
	Edit attribute. Text height	Section 5.8.5, Edit attribute. Text height.
	Edit attribute. Lgroup	Section 5.8.6, Edit Attribute. Lgroup.
	DDEDIT	AutoCAD
	Attedit	AutoCAD

Table 5-1. Pull-Down Menus (Continued)

Title	Function	Description
Draw	Line	AutoCAD
	Arc	AutoCAD
	Circle	AutoCAD
	Point	AutoCAD
	Donut	AutoCAD
	Ellipse	AutoCAD
	Polygon	AutoCAD
	3DFACE	AutoCAD
	Hatch...	AutoCAD
	Text	AutoCAD
	Att.def, Base	Section 5.9.1, Attribute Definitions, base
	Attr.def, Extended	Section 5.9.2, Attribute definitions, extended
	Attr.def, Extra	Section 5.9.3, Attribute definitions, extra
	Make block	Diagram Builder

5.2.2 Digitizer and screen menus

These menus contain only general AutoCAD and Diagram Builder functions. Functions specific to the Diagram Builder are described later in this manual.

5.3 Settings

5.3.1 Configure

Opens a dialog box in which the user can change certain variables that affect the drawing environment. The configuring of the drawing includes a general Diagram Builder part, described in the Diagram Builder Reference Manual, chapter 2.19, and another part specific to the Electrical Diagram Builder, which is described below. The configuration settings are saved in the drawing and only need to be done once. It is also possible to save a specific configuration in a separate file, for example, for a specific project, which can then be used as a template for related drawings.

The most common method of creating such a template is to make the setup in the basic drawing so that it is correctly adjusted in all subsequent drawings. Remember that new drawings based on old drawings may need to be reconfigured.

For further information see the Diagram Builder Reference Manual, chapter 2.19.

The following items can be configured by the Electrical Diagram Builder Layout:

Insertion of hole pattern

Checks whether the hole pattern should be inserted simultaneously with the symbol.

Dialog box for symbol attributes.

Checks if the dialog box with the symbol's total attributes will be shown in connection with the insertion.

Access:	Digitizer menu: ADJUSTMENTS, CONFIG Screen menu: DIBCONFIG, CONFIG
Procedure:	Press “CONFIG”. Change values. Press “OK”.

5.4 File

5.4.1 About Layout

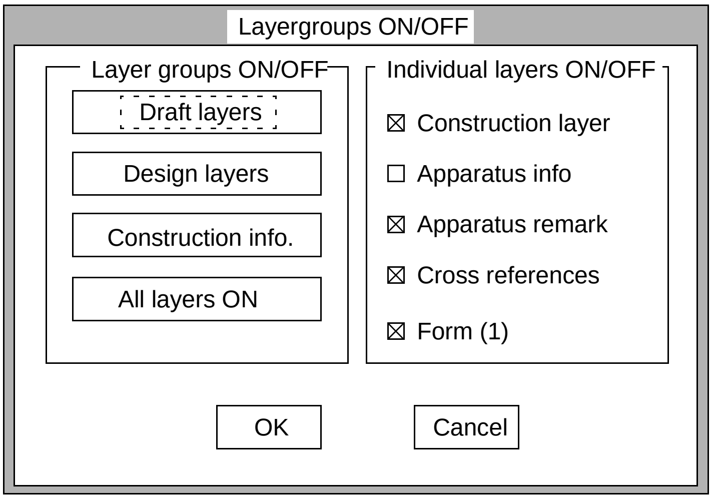
Function:	Information on the program, such as version.
Access:	Pulldown menu: File, About Layout...

5.4.2 End Layout

Function:	Saves drawing and quits the program. AutoCAD commands end.
Access:	Pulldown menu: File, End Layout.

5.5 View

5.5.1 On/Off Layer



☒ Construction layer
☐ Apparatus info
☒ Apparatus remark
☒ Cross references
☒ Form (1)

Figure 5-2. Layer Groups ON/OFF

Function: Toggles layers and layer groups on and off. Information in the dialog box shows the status of the different layers/layer groups. Selections marked with a cross are "on".

The dialog box also makes it possible to activate the layer to create layout or hole punch drawings, as well as to activate all of the layers.

The Mounting area, Centerline, and Measurement adjustment selections turn on and off the corresponding layers in all of the layer groups.

The layer groups used by the program are listed in Section 5.10.3 Layers and layer groups, and should not be altered.

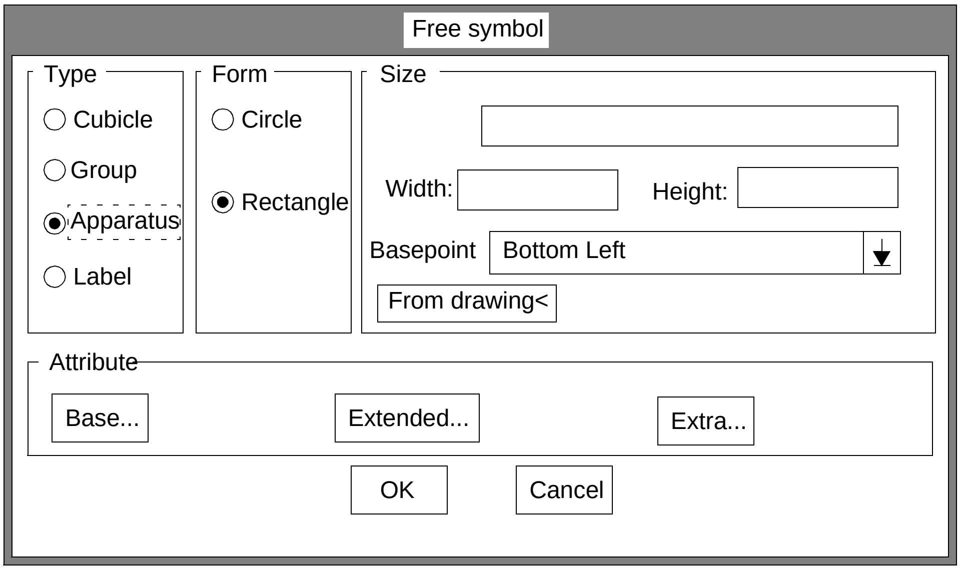
Access: Pulldown menu: View, Layer...

Procedure: Click on the cross checkboxes for layer/layer groups or the buttons.

End with OK or CANCEL.

5.6 Symbols

5.6.1 Free Symbol



Basepoint Bottom Left

Figure 5-3. Dialog Box - Free Symbol

Function: Draws a free symbol in the shape of a circle or a rectangle. The function creates a so-called anonymous block. This should be handled as an ordinary block, but does not have a specific name.

The adjustments for type, form, measure, and attribute are always saved from the previous session.

Measurements can be given in millimeters, inches, or as a number of module units, for example, 19", 5S, 2C, and so on. Width and Height may also be given by two corner points.

The block attributes are defined in the same way as the functions “Attribute definition, base, extended, and extra.” For further information see Section 5.10.6 Description of attribute settings.

Access: Pulldown menu: Symbols, Free symbol...

Procedure: From the dialog box choose type, form, and measurement. If extra and/or extended attributes are desired, use this function.

End with OK.

Give insertion point.

If extra and/or extended attributes have been defined, give their insertion points.

5.6.2 Inserting symbols from the symbol library

Function: Inserts symbol from the chosen library.

The insertion method depends on the settings for each symbol library. It is possible, for example, to choose whether all of the insertions should be made using a constant angle or whether a different angle should be used for each insertion.

The insertion process also depends on the configuration of the “Insertion hole pattern” selection and the “Dialog box for symbol attributes.”

To install the hole pattern, the symbol hole pattern reference PUNCH must be marked and the corresponding symbol must be in the library HOLES.

Access: Pulldown menu: Symbols

Procedure: Choose Symbol library.

Choose symbol.

Specify insertion point.

Specify desired angle and so on, depending on the library configuration.

For symbols in the library BARS, RAILS, and so on, also choose length.

5.7 Construction Aid

5.7.1 Increment item designation

Function: Increment item designation. Used by the functions Copy Row and Copy One.

Access: Pulldown menu: Constr. Aid, Increment item des.

Procedure: Enter a positive integer in the field marked “Increment item designation”, or press Return to accept the default value.

5.7.2 Copy One

Function: Copies a symbol and steps up the item designation.

This function also inserts a hole pattern if the configuration “Insertion of hole pattern” is switched on and the hole pattern reference has been marked.

The stepping-up of the item designation proceeds according to the following rules:

- If the item designation is a number, the new value is equal to the item designation of the original together with the value of the increment item designation. For example, “1” to “2”, “100” to “101” and so on.
- If the item designation consists of a letter and a number, the value of the increment is added to the numeric part. For example, “K1” to “K2”, “RS100” to “RS101”, and so on.
- If the original item designation ends with a letter, there will be no stepping-up for the copy.

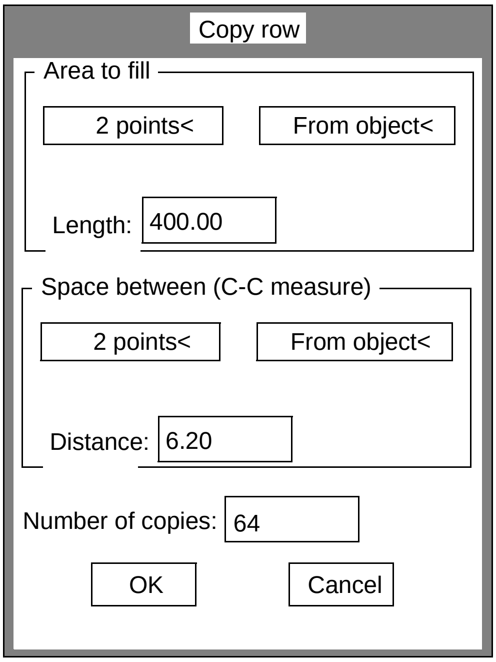
Access: Pulldown menu: Constr. Aid, Copy One.

Procedure: Choose a symbol to be copied.

Choose a new insertion point.

If the increment for the item designation has not been given earlier, it should be given now.

5.7.3 Copy Row



Length: 400.00

Distance: 6.20

Number of copies: 64

Figure 5-4. Dialog Box - Copy Row

Function: Copies a row and steps up the item designation.

The function also inserts hole patterns if the “insertion of hole pattern” setting is switched on and the hole pattern reference has been marked.

To create copies of a row, the function must know two things: the number of copies, and the distance between the rows. The values for this information can be entered into the dialog box in various ways (see below).

Alternative 1:

Specify an area to be filled with copies and indicate the desired distance between copies.

The number of copies that fit into the area is automatically calculated.

Alternative 2:

Specify the number and the distance between the copies.

The space to be filled and the distance between can be given in three different ways:

- By pointing out two points in the drawing.
- By pointing at a visible line in the drawing.
  For example, if you point at one of the short sides of a terminal, the copies will be placed without any space between (that is, C-C measure will be the same as the width of the terminal.)
- By specifying a measurement in millimeters, inches, or a number of module units.

Stepping-up of the item designation is done in the same way as for the “Copy One” function described above.

If the increment for the item designation has been marked earlier, its value is shown in the text line at the bottom edge of the dialog box.

Access: Pulldown menu: Constr. Aid, Copy Row...

Procedure: Choose the copy symbol.

In the dialog box, specify the length to be filled and the required distance between rows. Alternatively, enter the required number of copies and the distance between each.

If the increment for the item designation has not been given earlier, it should be given now.

End with OK.

5.7.4 Insertion of hole patterns

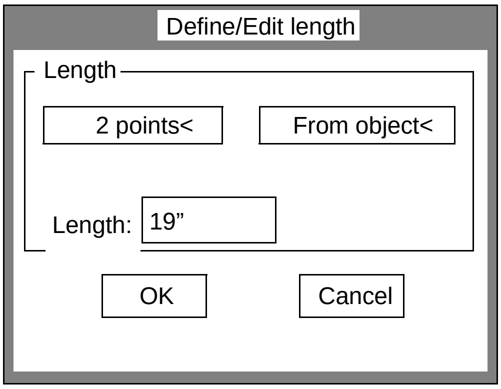
Function: Inserts a hole pattern.

For this function to be performed, the hole pattern reference must be marked. The value of the hole pattern reference must be the same as the symbol name (file name) of the hole pattern. The hole pattern should be in the symbol library HOLE.

Access: Pulldown menu: Constr. Aid, Hole Pattern

Procedure: Choose Symbol.

5.7.5 Length Bars



Length: 19”

Figure 5-5. Dialog Box - Define/Edit Length

Function: Changes length of a bar, that is, mounting bar, terminal bar and so on. This function is also useful for cable channels (conduits).

Bars and cable channels (conduits) are drawn as so-called 1 x 1 blocks. That is, they have the correct height but their length is only one mm. To change the length, the block’s X-scale must be changed to the desired length.

The length can be specified in any of the following ways:

- By specifying a terminal point when the system prompts “Point out length, or RETURN for the dialog box”.
- Via the dialog box by specifying two points in the drawing, by pointing at another object in the drawing, or by specifying a measurement in millimeters, inches, or a number of module units.

The length can be a positive or negative number. If the number is negative, the symbol is drawn in the opposite direction of the original.

Access: Pulldown menu: Constr. Aid, Length Bar

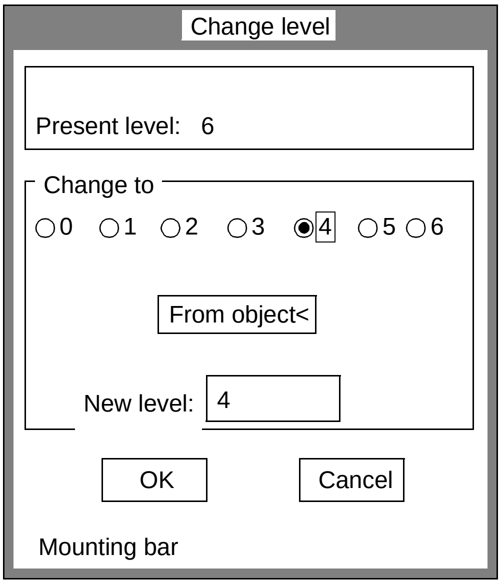
Procedure: Choose a symbol.

Point out length (point to a terminal) or press RETURN for the dialog box.

If applicable, specify the length in the dialog box.

End with OK.

5.7.6 Level



Present level: 6

New level: 4

Mounting bar

Figure 5-6. Dialog Box - Change Level

Function: Changes the level of the object. The level of the object coordinate in Z direction is used to remove the underlying hidden lines with the command HIDE.

The present level is shown in the dialog box. If several objects have been chosen and these are not on the same level, the text “varied” appears in the bottom section of the dialog box.

A new level can be specified in different ways: either by choosing one of the “0-6” buttons pointing to another object, or by manually entering an integer.

When the level is chosen with the “1-6” buttons, a help text appears in the bottom section of the dialog box that describes the purpose of each level.

Access: Pulldown menu: Constr. Aid, Level...

Procedure: Choose symbol.

In the dialog box, specify the new level.

End with OK.

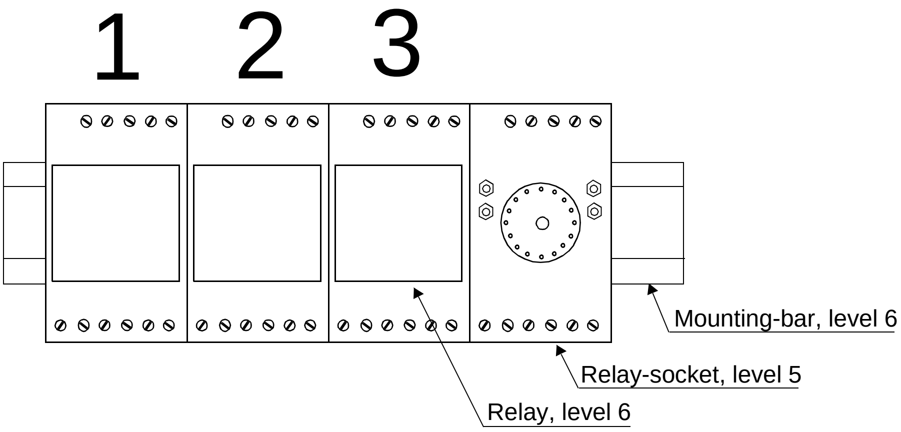


Figure 5-7. Example on Level of Objects

5.8 Modify

5.8.1 Edit attribute. Value.

Function: Edits value of attributes in blocks.

Access: Pulldown menu: Modify, Edit Attribute, Value.

Procedure: Choose block.

Specify new values through the dialog box.

End with OK.

5.8.2 Edit Attribute. Position.

Function: Moves attribute.

Access: Pulldown menu: Modify, Edit Attribute, Position.

Procedure: Choose Attribute.

Specify new insertion point.

5.8.3 Edit Attribute. Angle 0+position.

Function: Changes the angle of the attribute to zero and requests new insertion point.

Access: Pulldown menu: Modify, Edit Attribute, Angle 0-pos.

Procedure: Choose attribute.
Specify new insertion point.

5.8.4 Edit Attribute. Angle.

Function: Changes the angle of the attribute.

Access: Pulldown menu: Modify, Edit Attribute, Angle.

Procedure: Choose attribute.
Specify new angle.

5.8.5 Edit attribute. Text height.

Function: Changes the text height of the attribute.

Access: Pulldown menu: Modify, Edit Attribute, Text height.

Procedure: Choose attribute.
Specify new text height.

5.8.6 Edit Attribute. Lgroup.

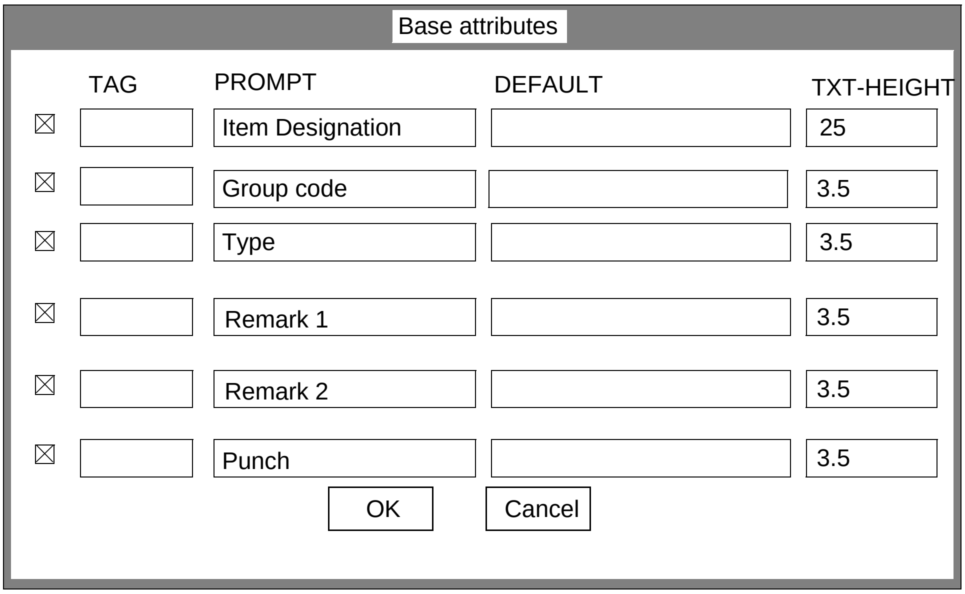
Function: Changes layer group on attribute, for example, layer D11 (constr. aid) to H11 (hole pattern).

Access: Pulldown menu: Modify, Edit Attribute, Lgroup

Procedure: Choose attribute.
Specify a new layer group through the dialog box.
End with OK.

5.9 Draw

5.9.1 Attribute Definitions, base



	TAG	PROMPT	DEFAULT	TXT-HEIGHT
☒		Item Designation		25
☒		Group code		3.5
☒		Type		3.5
☒		Remark 1		3.5
☒		Remark 2		3.5
☒		Punch		3.5

Figure 5-8. Dialog Box - Base Attributes

Function: Sets attribute definitions (ATTDEF), basic. All values in the dialog box except TAG can be changed. In the basic configuration, all except PUNCH are required. To remove PUNCH from the set up, mark the appropriate check box.

See Section 5.10.6 Description of attribute settings for further information.

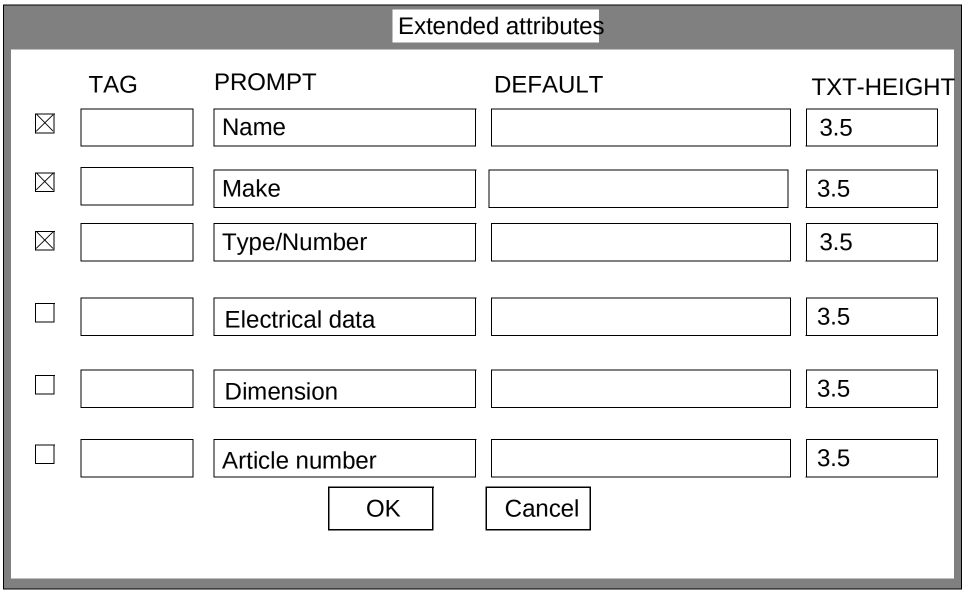
Access: Pulldown menu: Draw, Attr. Def, base...

Procedure: Specify desired values through the dialog box.

End with OK.

Choose Insertion point.

5.9.2 Attribute definitions, extended



Extended attributes

	TAG	PROMPT	DEFAULT	TXT-HEIGHT
☒		Name		3.5
☒		Make		3.5
☒		Type/Number		3.5
☐		Electrical data		3.5
☐		Dimension		3.5
☐		Article number		3.5

Figure 5-9. Dialog Box - Extended Attributes

Function: Sets attribute definition (ATTDEF), expanded.

In the dialog box, all values TAG may be changed.

See Section 5.10.6 Description of attribute settings for further information.

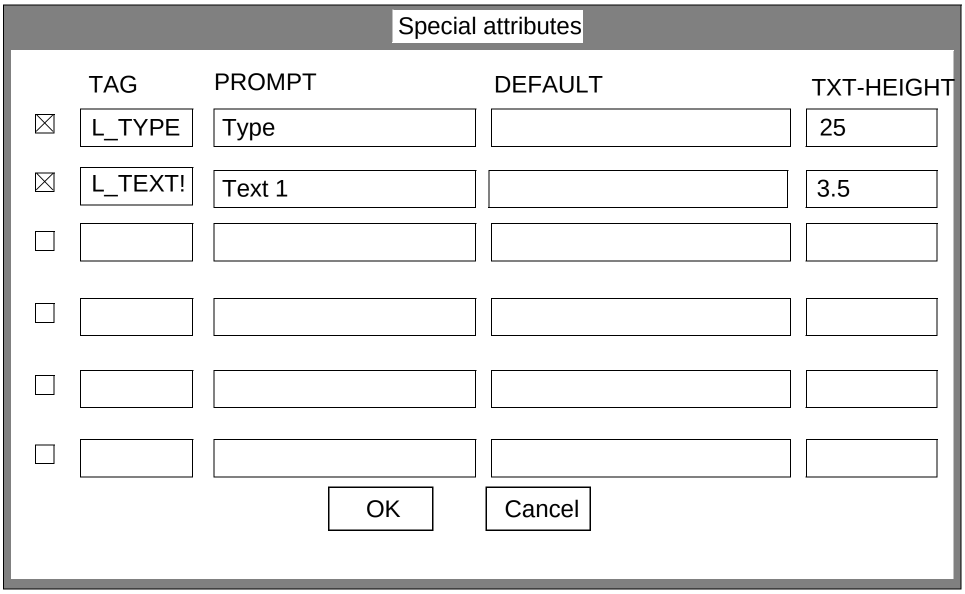
Access: Pulldown menu: Draw, Attr. Def., extended...

Procedure: Specify appropriate new values through the dialog box.

End with OK.

Specify insertion point.

5.9.3 Attribute definitions, extra



	TAG	PROMPT	DEFAULT	TXT-HEIGHT
☒	L_TYPE	Type		25
☒	L_TEXT!	Text 1		3.5
☐				
☐				
☐				
☐				

Figure 5-10. Dialog Box - Special Attributes

Function: Sets up attribution definition (ATTDEF), extra.

In the dialog box all values may be changed.

See Section 5.10.6 Description of attribute settings for further information.

Access: Pulldown menu: Draw, Attr. Def., extra...

Procedure: Specify appropriate new values through the dialog box.

End with OK.

Specify insertion point.

5.10 Maintenance and adjustments

This section describes the adjustments and conventions used by the Electrical Diagram Builder Layout.

5.10.1 Configurations

Except for the existing general AutoCAD—and Diagram Builder—configurations, it is also possible to specify “insertion of hole pattern” and “dialog box for symbol attribute.” These adjustments influence the procedure when a symbol is inserted or copied.

If “Insertion of hole pattern” is on, the hole pattern that is defined in the attribute symbol “PUNCH” will be inserted. The hole pattern should be a symbol in the symbol library “HOLES”.

If “Dialog box for attribute at insertion of symbol” is on, a dialog box appears with the total attributes each time a symbol is inserted.

5.10.2 Module Unit

In the functions “Free symbol”, “Copy line,” and “Length bars,” it is possible to specify certain measurements in “Number of module units.” In the file LAYINIT.LSP, the module system to be used is defined as well as the corresponding millimeter measurement. To add, change, or make corrections to this file, the basic adjustment is:

S-module = 44.45 mm

C-module = 7.0 mm

5.10.3 Layers and layer groups

The layer groups are shown in Table 5-2.

Table 5-2. Layer Groups

Layer Group	Prefix
Enclosure/Cubicle	C
Group/Plates	P
Apparatus	A
Hole punch	H
Label/Sign	S
Design Aid	D

Each layer group contains the layers according to Table 5-3.

Table 5-3. Layers of Layer Groups

Layer	Description
01	Continuous, thick
02	Continuous, fine
03	Dashed, thick
04	Mounting area. Dashed, fine
05	Center line. Dashdot, fine
06	Dashdot, thick
07	Dabble dashdot, fine
08	Dimension, line
09	Pos. no.

Table 5-3. Layers of Layer Groups (Continued)

Layer	Description
10	Hatch
11	Text, fine
12	Dimension, text
13	Text, thick
14	Design
15	Drawing frame
16	Information

5.10.4 Self generated symbols

When you create your own symbols, it is particularly useful if these follow certain rules with regard to appearance and shape. The symbols delivered with the system at the installation are made according to the following rules:

- Scale 1:1
- Outlines are drawn on layer 01. All other lines in the symbol are made with layer 02. Center lines are drawn on layer 05. Center lines should always be defined since these are of great help during insertions and setting of measurements.
- When the mounting area is the same as the outline, the outline is made with AutoCAD's command 3DFACE on layer 04. 3DFACE is used to remove hidden lines with HIDE.
- On certain front mounted devices (for example, push button), the part of the device placed behind (inside) the mounting area is larger than the rest of the device. This is then drawn as a mounting area with the help of 3DFACE on layer 04 and on a level located behind the rest of the symbol.
- Symbols should be provided with attributes. Fieldnames (TAG) ID, NA, TY, EG1 and ED2 are required.

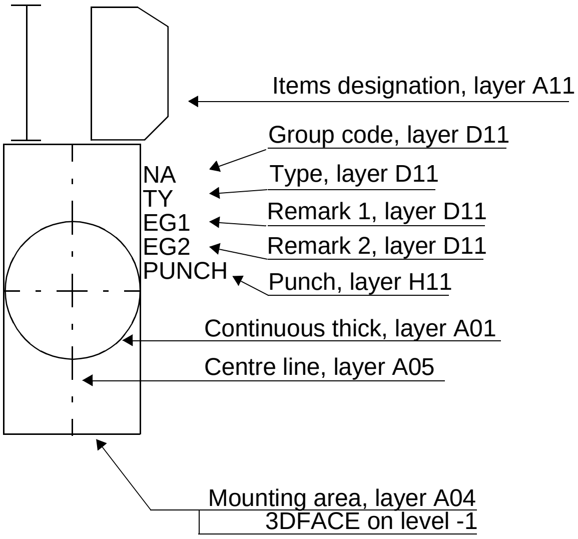


Figure 5-11. Example on Self Generated Symbol

Table 5-4. Layers/Layer Groups for Symbols

Type	Part of Symbol	Remark	Layer
Enclosure/cubicle	Outline	C=Cubicle/Cabinet	C01,C02
	Mounting area		C04
	Centerline		C05
	Dimension, line		C08
	Dimension, text		C12
	Attribute, id	Local oriented item des.	C11
	Attribute, other		D11
Group	Outline	P=Panel/Plate	P01,P02
	Mounting area		P04
	Centerline		P05
	Dimension, line		P08
	Dimension, text		P12
	Attribute, id	Local oriented item des.	P11
	Attribute, other		D11

Table 5-4. Layers/Layer Groups for Symbols (Continued)

Type	Part of Symbol	Remark	Layer
Apparatus	Outline	A=Apparatus	A01,A02
	Mounting area		A04
	Centerline		A05
	Dimension, line		A08
	Dimension, text		A12
	Attribute, id	Local oriented item des.	A11
	Attribute, other		D11
	Attribute, hole punch ref.		H11
Hole punch		H=Hole	H01,H02,H03
Label/Sign	Outline	L=Label	L01,L02
	Attribute, id	Local oriented item des.	L11
	Attribute, text		L11
	Attribute, other		D11
Design Aid		D=Design	D01-D16

5.10.5 Symbol library creation

The symbol library can be installed arbitrarily. The system variable “MLUSER” should contain a search path to the highest level in the directory structure.

Table 5-5. Symbol Library

Symbol type	Library	Level	Remark
Enclosure	CUBICLE	0	
Mounting plate	PLATE	2	
Device group	GROUPS	2	
Panel instrument	INSTR	6	Front-mounted apparatus
Rotating switch	ROTSW	6	
Push-button	PUSHBUTT	6	
Lamp/Indicator	LAMP	6	
Front-mounted, other	MSC-PAN	6	
Terminal blocks	TERMINAL	6	Cubicle-mounted apparatus
Contactor	CONTACT	6	
Auxiliary relay	AUXRELAY	6	
Control system	PLC	6	
Breaker	BREAKER	6	
Fuse	FUSE	6	
Front-mounted, other	MSC-CUB	6	
Mounting-bars	BARS	4	These symbols are so called 1x1-block, with correct height and 1mm width.
Current- and earth-rail	RAILS	4	
Cable-duct	DUCTS	4	
Cubicle-base	BASE	0	Accessories etc.
Hole punch	HOLES	6	
Label/Sign	LABEL	6	
Additional symbol	ADDITION	6	
Ruler	RULER	0	
Accessories, other	MSC-ADD	-	

5.10.6 Description of attribute settings

The attributes ID, NA, TY, EG1 and EG2 are required.

Table 5-6. Attribute - Base

TAG	Prompt	Text-Height
ID	Item designation	25
NA	Group code	3.5
TY	Type	3.5
EG1	Remark 1	3.5
EG2	Remark 2	3.5
PUNCH	Punch	3.5

Table 5-7. Attribute - Extended

TAG	Prompt	Text-Height
BEN	Description	3.5
FAB	Manufacture	3.5
TPN	Type number	3.5
ELD	El. data	3.5
DIM	Dimension	3.5
FRD	Art. number	3.5

Attribute, special

In certain cases it may be necessary to provide symbols with more or different attributes from the ordinary set. To separate the special attributes from the ordinary attributes, the beginning of the special attributes start with a prefix: letter + underscore sign (L_).

Examples of special attributes:

Attributes for specifying the function of a symbol (for example, to explain a function of an instrument). Prefix: S_ (for SYMBOL).

Attributes for labels such as: Text, label shape, operation (engraving). Prefix: L_ (for LABEL).

Table 5-8. Attribute - Example

TAG	Prompt	Text-Height
S_TYPE	Instrument Type	Free
etc.		
L_TEXT1	Text 1	
L_TEXT2	Text 2	
etc.		
L_BLK	Label shape	
L_OP	Label operation	

Appendix A Convention for naming symbols

This section describes the rules that apply to names of elder symbols delivered together with the Electrical Diagram Builder, and which are partly hard-coded in the delivered digitizer menus.

NOTE

The rules described here do not correspond completely to rules recommended for new symbols made in Advant Station 500 Engineering Station. Therefore, see the *AdvaBuild Diagram Builder User's Guide*, Appendix B.

The main differences are:

- **E** is used instead of **K** as first character for circuit diagram symbols
- Variant code/Symbol orientation code (last character)
- Supplier code at **4th** position instead of **3rd.**

The name is composed of a number of codes, where the first character describes what type of diagram or drawing the symbol is designed for.

The first character codes:

K = Circuit diagram

L = Layout drawing

To tell what type of apparatus the symbol represents, the codes for function-oriented item designation, block 3, in IEC750 are used.

Supplier can be indicated in those cases where the symbol is not general, for example, for circuit diagram symbols not in standard and layout symbols.

To explain the specification in the simplest way, we have divided it into the different types of drawings and symbol-types.

A.1 Layout-drawing

A.1.1 Supplier specific symbols (enclosures, instruments, contactors etc.)

L+Apparatus type+Supplier+Code+Variant

Apparatus type:

One letter in accordance with IEC standards.

Supplier:

One letter (see below).

Code:

Four characters. Part of the order number, extension number, or other similar number.

Variant:

One letter (see below).

A.1.2 Standard symbols (Bars, sockets etc.)

L+Code+Variant

Code:

Six characters. Part of the order number, extension number, or other similar number.

Variant:

One letter (see below).

A.2 Circuit diagram

A.2.1 Symbols according to IEC617

K+Apparatus type+IEC-number+Variant

Apparatus type:

One letter in accordance with IEC standards.

IEC-number:

Five digits (leading zero in IEC-number removed).

Variant:

One letter (see below).

A.2.2 Combined symbols

K+Apparatus type+Code+Variant

Apparatus type:

One letter in accordance with IEC standards.

Code:

Five characters. Part of the order number, extension number, or other similar number.

Variant:

One letter (see below).

A.2.3 Supplier specific symbols

K+Apparatus type+Supplier+Code+Variant

Apparatus type:

One letter in accordance with IEC standards.

Supplier:

One letter (see below).

Code:

Four characters. Part of the order number, extension number, or other similar number.

Variant:

One letter (see below).

A.3 Qualifying symbols

That is, symbols that can be used in different types of diagrams and drawings.

A.3.1 According to IEC617-2

Q+IEC-number+Variant

IEC-number:

Six digits.

Variant:

One letter (see below).

A.3.2 Other

Q+Code+Variant

Apparatus type:

One letter in accordance with IEC standards.

Code:

Six characters. Running number, code, etc.

Variant:

One letter (see below).

A.4 Application specific symbols (references etc.)

For example, symbols specific to a certain application, such as references, blocks for codes etc.

A+Code+Variant

Code:

Six letters.

Variant:

One letter (see below).

A.5 Supplier Codes

One letter according to the following:

A = ABB

T = Telemecanique

S = Siemens

etc.

A.6 Variant Codes

One letter according to the following:

A = Variant “A”

B = Variant “B”

C = Variant “C”

H = Horizontal

V = Vertical

L = Left

R = Right

U = Up

D = Down

F = Front

A.7 Applied examples

Layout symbol for contactor type ABB EH40:

LQAEH40U.DWG

L = Layout.

Q = Acc to IEC 750 switch for main circuit

A = Supplier ABB.EH40 = Code.U = Variant Up

Circuit diagram symbol for contactor type ABB EH40:

KQAEH40H.DWG

K = Circuit diagram.

Q = Acc to IEC 750 switch for main circuit

A = Supplier ABB.

EH40 = Code.

H = Variant horizontal.

Layout symbol (frontal drawing) for enclosure type VSH 700:

LAAVSH7F.DWG

L = Layout.

A = Acc to IEC 750 function unit

A = Supplier ABB.

VSH7 = Code.

F = Front.

Circuit diagram symbol NO-contact (IEC 617-7 no 07-02-02):

K070202H.DWG

K = Circuit diagram.

070202 = IEC-number.

H = Variant horizontal.

Circuit diagram symbol for signal-lamp with serial resistor:

KH12345H.DWG

K = Circuit diagram.

H = Acc to IEC 750 signal equipment

12345 = Code.

H = Variant horizontal.

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